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Casting Small Parts in Production Foundry

Short Side Movements Supplement Continuous Forward Progress in New Gilbert & Barker Mfg. Co. Plant—Ample Distance from Bed to Charging Door

—BY GERARD FRAZAR—

IN designing the new foundry of the Gilbert & Barker Mfg. Co., Springfield, Mass., the engineers not only arranged the various working departments with a view to quantity production at a minimum operating cost, but embodied ventilating and lighting features that insure maximum comfort and health of employees. The plant is equipped for con-

flooring expedites the movement of electric trucks, eliminates to a great degree wet working areas, and has other well known advantages. Wherever possible, large wall windows are installed. In addition, practically every department is provided with generous overhead natural light and ventilation through monitors and doors leading outside each department, as well as



Light Is Provided for the Foundry Proper, Not Only by Windows in Side and End Walls and Monitors, but Also by the White Paint on the Inner Wall

tinuous pouring and when run at capacity will give employment to approximately 300.

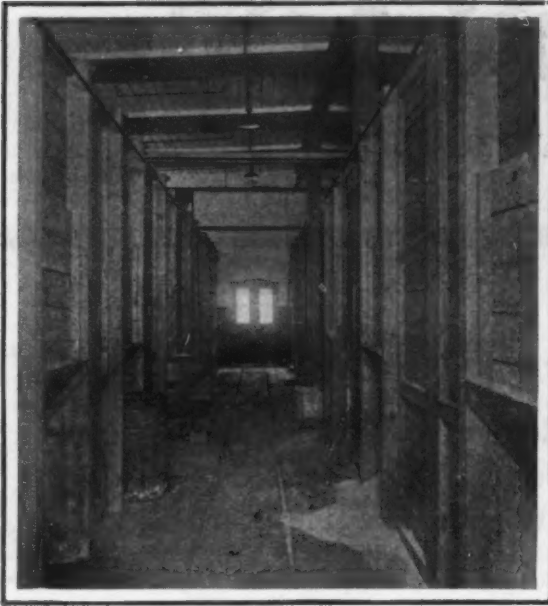
Briefly, it is composed of a 60 x 450 ft. main foundry, with executive offices on one end, and cleaning room and pattern storage, galvanizing department, sand storage, cupolas, core rooms and brass melting department arranged in sequence adjoining one side of the foundry proper. In the arrangement of these subsidiary units, the continuous forward movement of products in the process of manufacture was kept in mind, as has been common practice in foundry design recently. In this instance, however, the forward movement is accompanied by a series of short side movements related to core baking, so timed, by location of working positions, as to minimize lost motion in the general forward movement of products. The plant is strikingly compact for one of its proportions.

In the main foundry and in many of the subsidiary units the flooring is laid with approximately 300,000 creosoted wooden blocks, costing about \$25,000. This

to the foundry proper. The plant is heated by steam throughout. The foundry walls are 37 ft., 6 in. high, being 32 ft. to the bottom of the trusses. All windows in the top of the main foundry are mechanically operated and can be tipped to an angle of 90 deg.

The main foundry is served by one 10-ton and one 5-ton Shepard electric traveling crane. In addition, there are six one-ton Curtis pneumatic wall cranes at convenient points. With such crane equipment and with electric trucks the handling of sand, flasks and castings ranging from ¼ lb. up is speeded. No wooden flasks are used, the foundry being equipped with Sterling steel and Adams snap flasks especially adapted for Gilbert & Barker Mfg. Co. products, which are principally gasoline and oil measuring pumps. Castings for these products do not run much above 300 lb. The crane equipment is adapted for much larger castings in anticipation of changed requirements.

All mold-making is mechanical, 21 shockless and 31 jar and squeeze type—a total of 52 Tabor machines—



Steam Heat Keeps the Sand from Freezing in Winter. The track for the sand cars is set in a concrete floor in the sand storage department

constituting the equipment. The molding machines are, as is usual, arranged along both sides of the long walls of the main foundry and are air-operated. Air, steam, water and oil are delivered to the plant through an underground conduit from the power house, some distance away. All delivery piping inside the plant is contained in metal-covered, cement trenches extending along inside walls, easily accessible in case repairs are necessary. At one end a spur from the general yard switching trackage enters the main foundry, which provides for one car at a time to be loaded and unloaded under cover.

The core room, 60 x 100 ft., is located in the lower end of the plant. Here the arrangement of the equipment provides liberal space for the movement of cars. The oven equipment design is of the latest of the W. W. Sly Mfg. Co., Cleveland. There are 14 ovens in all, seven draw and the balance two-car type. The small or draw ovens are 6 ft., 5 in. x 3 ft., 10½ in., and the others 5 ft., 8 in. x 14 ft., 6 in. each. All are oil-heated and are provided with Gilbert & Barker burners. Two Spencer turbo blowers serve these ovens as well as two brass melting furnaces in an adjoining unit. The two-

car ovens are the double-end style, the cars being pushed into the ovens from one end and subsequently out the other end, where the cores are trimmed, inspected, etc., on the main foundry molding floor.

The Gilbert & Barker products involve light brass parts. To provide for these, two oil-burning, brass-melting furnaces equipped with the company's burners, each with a capacity of 1800 lb. per eight-hour running time, are installed in a separate unit, 19 x 40 ft., at the right of the extreme lower end of the main molding floor and in close proximity to the core oven room. Cement, instead of wooden blocks, constitutes the flooring in this, as well as the core oven unit. Though molding of brass castings is distinctly apart from other molding, the arrangement of the units allows the two classes of work to dovetail.

Mixing of sands is done by two direct motor-driven Beystone Mfg. Co., Cambridge Springs, Pa., mixing machines in a separate unit within the sand storage department. In this mixing room is located also the electric control, not only for the mixing machines, but for two 5 hp. a.c. skip hoists, as well. These skip hoists operate above 14 sand storage bins in the department proper, each of which have a capacity of 60 tons, or a total of 840 tons. The storage department being steam heated, an adequate supply of workable sand can be maintained in the coldest weather. The sand is unloaded from cars on a railroad siding outside this department. Skips operate through swinging doors, over inclined wooden tressles to the cars where they are loaded, and returned to the bins. By the electric control the skips can be stopped at any predetermined point or bin, and automatically unloaded, thereby reducing handling charges. The flooring in the sand storage is of cement in which tracks and turntables are inserted for transporting sand in push cars, an auxiliary system for use only when electric trucks become incapacitated or overloaded. Each bin has its individual card on which is a record of the grade of sand, the car number and from whom the sand is purchased, dates of storage and usage.

An extremely satisfactory distance between the bed and the charging door, which gives maximum efficiency, is the outstanding feature of the cupola installation. This installation consists of a No. 9½ and a No. 8 Whiting cupola, the former having a shell diameter of 90 in. and an inside diameter of 70 in., while the shell diameter of the No. 8 is 78 in. and the inside 60 in. Combined, these two cupolas have a capacity of 30 to 35 tons per hour. Their total height is 51 ft., and



There Are 14 Core Ovens, Seven Draw and the Remainder Two-Car Type. The latter are of the double-end style



The Distance from the Bed to the Charging Doors of the Cupolas Is 21½ Ft.

from the bed to the charging door is 21 ft., 6 in. It is therefore possible to charge each of the cupolas heavily before turning on the air.

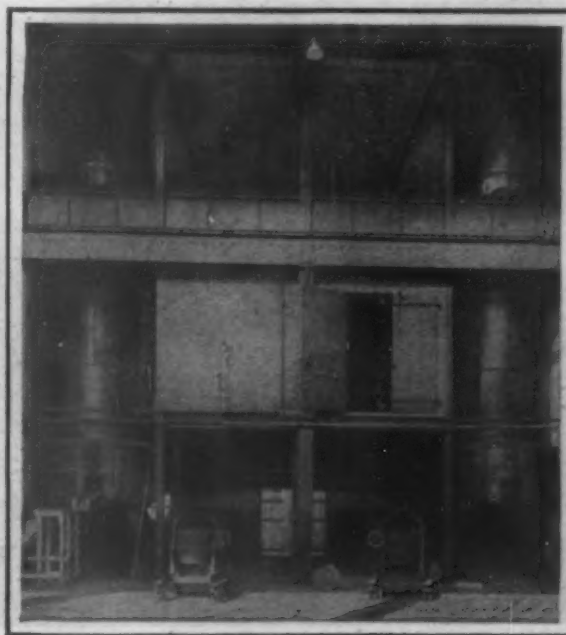
Air for the No. 9½ cupola is furnished by a No. 7A Wilbraham-Green rotary positive pressure blower, direct-connected to motor, having a displacement of 55 cu. ft. per revolution. The No. 8 cupola is served by a No. 6A blower, of the same make and similarly connected, having a capacity of 35 cu. ft. per revolution. These blowers are stationed in an intermediate brick room below the charging floor, together with a system for heating water used in washrooms. Adjoining this room is the laboratory, which is comparatively small, but excellently equipped for all requirements. The proximity of this laboratory to the cupolas is a favorable feature.

The cupola charging equipment is mechanical and also is furnished by the Whiting Corporation. It consists of 3-ton iron charging cars, and combination coke and scrap charging cars, each having a capacity of 600 lb. of coke and 3000 lb. of scrap. The iron, scrap and coke are delivered to the charging floor by a 3-ton electric elevator with scales mounted on the floor of the elevator car. A cinder mill for reclaiming purposes is installed on the lower floor of the cupola house, from which a recovery of 500 lb. to 1000 lb. per day is possible. The present pouring equipment consists of Whiting ladle trucks of 1500-lb. capacity each, from which hand ladles are supplied.

The cleaning room, 40 x 100 ft., is built parallel and adjacent to the spur track leading into the upper or office end of the foundry proper. It is thus possible to care economically for dust delivered through pipes on the outside of the unit leading from a dust arresting system inside, by inserting these dust converters in flat cars used for yard refuse purposes. Along one of the 100-ft. walls of the cleaning room are arranged two Sly sand blasts and three Sly tumbling barrels. Eight double-end United States Electric Tool Co. grinders are positioned across the lower end of this room, while finishing and inspecting benches extend along the other long wall. The flooring in the cleaning room is of wooden blocks, but each piece of equipment rests on a concrete foundation.

From the cleaning room a large elevator runs to the pattern storage above. The elevator doors are fireproof and mechanically-operated by the elevator alone, consequently are fool-proof, as well. Patterns are stored on fireproof racks made of steel tubing with diamond plate shelving. These racks are arranged with ample space between them to permit free movement of trucks and employees. The foundry layout does not include a new pattern making shop, which, in this instance, comes under the direct supervision of the foundry superintendent. For the present, patterns will continue to be made in the company's old shop, located some distance from the new plant.

When necessary, castings are transferred by electric trucks from the cleaning room to the galvanizing department adjacent, the wooden block flooring in both units facilitating such work. This galvanizing depart-



Both Cupolas Are 51 Ft. in Height. Their shell diameters are 90 in. and 70 in., respectively



Two Oil-Burning Brass Melting Furnaces Are Installed in a Separate Unit. Each has a capacity of 1800 lb. in 8 hr.

ment is 40 x 100 ft. There are two galvanizing tanks at the lower end, one each side of the unit, set on concrete foundations, of 15-ton capacity each, and seven wooden pickling vats. The latter and the tanks are served by an elaborate overhead track system with generous headroom, on which six one-ton Curtis electric hoists and two hand hoists operate.

Two large washrooms are provided for employees, with accommodations for 150. Both hot and cold water are available, together with shower baths and individual lockers. These rooms are so constructed as to be easily and effectively flushed out.

Inasmuch as the Gilbert & Barker Mfg. Co. property covers 18½ acres, ample storage space for the foundry's raw materials is available.

Drawing as a part of engineering education and the layout and equipment of drafting rooms are to be discussed on Jan. 10 by Prof. Walter H. James, department of mechanical engineering, Massachusetts Institute of Technology, at a meeting of the Providence Engineering Society, Providence, R. I.

Proper Recognition of Employee a Factor in Success of Suggestion System

In connection with the question as to why some industrial managers are reluctant to adopt an employee's suggestion system, S. DeHart of the R. K. LeBlond Machine Tool Co., Cincinnati, in a monograph on the subject, states that suggestion systems are an unqualified success when the employee making the suggestion is given proper recognition by the management. This recognition, he adds, may be in the form of money; honorable mention in the factory magazine; or merely a pat on the back. "It is short-sighted policy to receive a good suggestion without giving the person who made it proper credit. Even though the suggestion cannot be used, the employee should be told the reason and encouraged to make other suggestions.

"Not long ago I visited a factory in the Middle West and while there saw a condition which obviously needed improvement and which could have been made by any employee having the slightest mechanical training. I spoke to one of the employees about it, thinking that perhaps it had not occurred to him that such a condition could be improved. He informed me that he was fully aware that the defect could easily be remedied, but had long since stopped suggesting improvements as he had never received any credit for those he had previously made. This company had a large box, labeled 'Suggestions,' placed conspicuously in the shop, but it had long since passed into desuetude for lack of interest of both employee and employer.

As an instance of the proper recognition of employees, the monograph in question mentions one large concern which names machine safeguards after the employee who suggests it. Another company rewards its employees for finding defective links in crane and sling chains, presenting a pocketbook to the employee who discovers one defective link and a gold watch to the employee finding the largest number of defective links.

"There is no question that there is good psychology in having the employee understand that his efforts along these lines are appreciated. It reacts favorably on the employee and also benefits the management."

The recent development in the southwestern oil fields has created such a demand for oil well tools that the Cree-Becker Oil Tool Co., Newark, Ohio, has been obliged to put on a night force to take care of it.



Cement Foundations Are in Readiness for Additional Tumbling Barrels. Where equipment does not stand the flooring is of wooden blocks

Improved Punch, Shear and Bar Cutter

To obviate tilting the piece in making beveling or mitering cuts (inconvenient to say the least in handling large rolled sections), the Buffalo Forge Co., Buffalo, has developed the machine shown in the accompanying illustrations. It is known as the new Buffalo armor-plate No. 26 universal, diagonal-stroke punch, shear and bar cutter. The makers state that after extensive experiment it was found that by inclining the shearing end at an angle mitering could be accomplished with the work held in a horizontal plane, allowing heavy sections to be cut without any lifting.

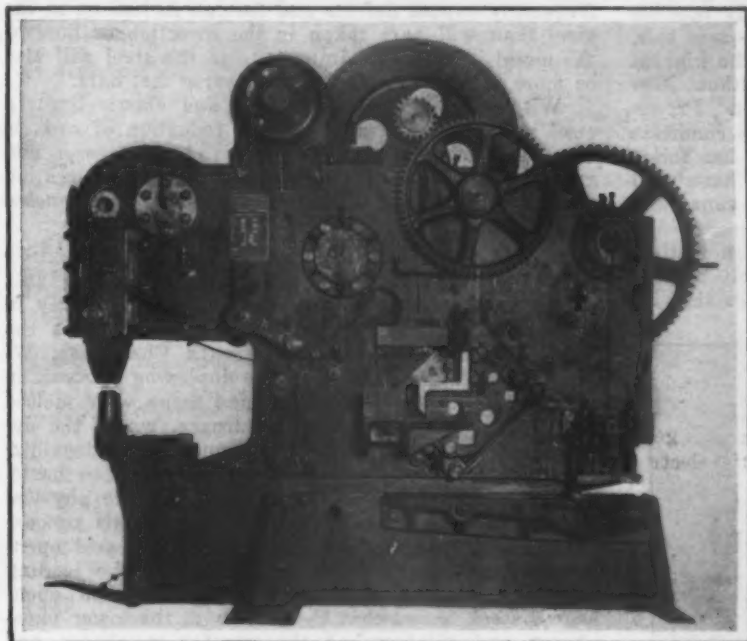
The machine is designed to take care of every punching, shearing and bar cutting requirement of a steel

over. For smaller beams the special dieblock is required.

The shear capacity includes $\frac{3}{4}$ -in. plates and $3\frac{1}{2}$ x 1-in. flats. Flats 8x5/16-in. or $2\frac{1}{4}$ x 1-in. can be handled with special upper knife. The throat is of special height to allow angles up to 6 in. to be trimmed.

Equipped with standard knives the bar cutter will handle $2\frac{1}{4}$ -in. rounds; 2-in. squares; 6x6 $\frac{1}{2}$ -in. angles square; 4 x 4 x $\frac{3}{4}$ angles, 45 deg. miter; and 4 x 4 x $\frac{1}{2}$, tee-square. With special knives 8-in. I-beams, 18 lb.; 9-in. channels 20 lb.; and 5-in. H-columns, 18.7 lb.; can be handled.

The capacity of the machine for coping is given as 5 to 10 in. beams in flanges; 5 to 9 in. channels in flanges; and up to 5x5 $\frac{1}{2}$ in. angles square. The width



Universal Diagonal-Stroke Punch, Shear and Bar Cutter. Full front view is shown at left. The arrangement for cutting left-hand miter is shown above and the head for punching in flange is shown below

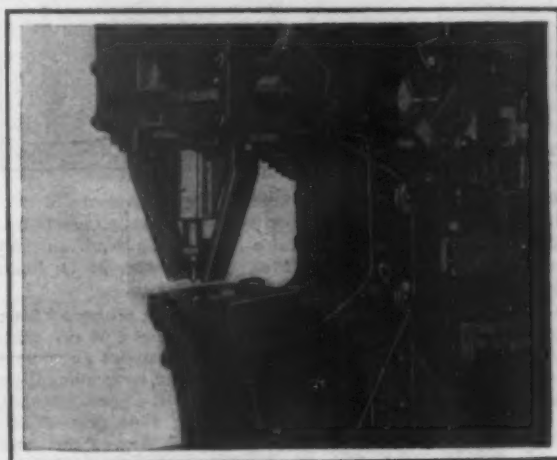
fabricating shop. The various operating points are located so that these operations can be performed simultaneously. The equipment includes two sets of punch holders and dieblocks for punching beams, channels, girders and H-columns of any size in both flange and web. Special attention is called by the makers to the fact that holes can be punched in any part of the web without turning the section over.

All gears are machine cut. Bearings are of ample proportion, bronze lined, and the flywheel bearing is of the ring oiling type. Power is furnished by a 7 $\frac{1}{2}$ hp. motor.

The frame is of the Buffalo "armor-plate" type, consisting of two rolled-steel plates with cast steel throat pieces, a construction permitting of considerable reduction in weight as compared with cast iron and steel-frame construction.

The punch has a 24-in. throat, 19 in. high. It is engaged by handle or foot treadle and is provided with a gag, making it semi-floating. The shear is engaged by means of a jaw clutch. The bar cutter is operated by shifting a ram by means of a counter-weighted lever. Stops for shearing angles square on 45 deg. miter are fixed, making it unnecessary to work the angles. The speed of the flywheel is 320 r.p.m. The strokes per minute of the punch and the bar cutter are 20.5; and of the shear, 21.5.

The following capacities are given: Punch, $1\frac{1}{4}$ x $\frac{3}{4}$ in. or 1x1 in. The standard dieblock and long punch holder punches flat material, the flanges of 8 to 26 in. girder beams; the flanges of 5 to 14 in. H-columns, with straight die; and the flanges of 7 to 30 in. I-beams, with bevel die. The additional dieblock and short punch holder punches flat material; the webs of 8 to 26 in. girder beams; (limited by the throat); the webs of 5 to 14 in. H-columns; and the webs of 5 to 26 in. I-beams (limited by the throat). All of the foregoing can be punched without turning the beams or columns



of the coping tool is 1 in. The capacity for 90 deg. miter notching is $3\frac{1}{2}$ x $3\frac{1}{2}$ x $\frac{3}{4}$ -in. angles.

Working Force Reduced

The Chicago, Milwaukee & St. Paul R. R. materially reduced its working forces on Dec. 17. At the seven shops of the road, 12,000 men were laid off. A 10 per cent reduction in the forces maintained at 400 roundhouses was made. About 50 per cent of the clerical employees were also dismissed for an indefinite period. In commenting on the order, H. E. Byram, president of the railroad, said: "Our employees have been asked to work half time and some to cease work entirely until the dull period is over. During the holidays, there is little freight traffic. This season of the year affords an opportunity to reduce forces temporarily. The order will be revoked immediately when business increases."

Sulphur and Oxides in Ordnance Steel*

Comparison of Open-Hearth and Electric Practice —Lower Sulphur Insures Superior Tough- ness—Details of Methods at Charleston Plant

—BY WILLIAM J. PRIESTLEY—

IN the manufacture of gun forgings and other steel parts that, in service, are subject to sudden high stresses and shocks, it is desirable to use steel possessing the greatest toughness and ductility possible without sacrifice of strength. In order to obtain this, it is necessary to procure steel that shows the highest possible elongation and reduction of area without lowering the tensile strength and elastic limit. Proper heat treatment of the steel can control this condition within certain limits. When heat treatment has failed to produce the desired results, metallurgists have used steels containing molybdenum, zirconium, vanadium, chromium, tungsten, etc.

The purpose of this paper is to describe a method by which these desired physical properties may be procured, by the elimination of certain impurities that in-

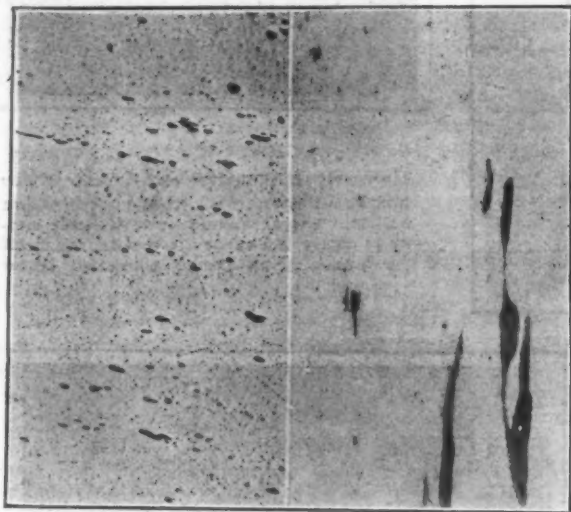


Fig. 1—Acid Open-Hearth Steel, Left, Unetched, $\times 25$; Right, Unetched, $\times 200$, Both Reduced About One-Third. This represents a longitudinal section taken from an acid open-hearth steel forging 11 in. in diameter, 28 ft. long, 7½-in. bore, weighing 6000 lb.

The carbon was 0.35; manganese, 0.68; silicon, 0.240; phosphorus, 0.040; sulphur, 0.053, and nickel 2.00 per cent. The physical tests (given in detail in the paper) show normal tensile strength and elastic limit but poor elongation and reduction of area, although meeting the specifications.

The forging was green annealed at 1600 deg. Fahr., rough machined and quenched at 1450 deg. Fahr. and drawn to 1200 deg. Fahr.

herently exist in steel made by the open-hearth process, and without the use of expensive alloys.

Design of Gun Forgings

In the manufacture of gun forgings, a certain elastic limit is fixed by the designer, and the walls of the gun are made of the proper thickness, allowing a suitable factor of safety for the high stresses and sudden shocks that occur during gun firing. The elastic strength of the gun is about 1.4 times the stress set up at any point along the bore of the gun during firing with the maximum powder charge.

As the stresses set up in the walls of the gun during firing are mostly "tangential," all physical tests

are taken in this direction, or transverse to the direction of flow of the metal in forging. Furthermore, test bars taken across the grain of the metal will more frequently expose defects and foreign inclusions in the steel than will bars taken in the direction of flow of the metal in forging. Impurities in the steel will also be more readily detected by transverse test bars.

With a fixed tensile strength and elastic limit, a steel with higher elongation and reduction of area is more desirable for service where sudden stresses and great shocks are encountered. The high elongation denotes ductility and the high reduction of area denotes toughness.

Results Obtained with Electric Steel

Some interesting results were obtained recently in the manufacture of heavy ordnance forgings at the U. S. Naval Ordnance Plant, South Charleston, W. Va. The steel was made by the duplexing process, in which cold charges of pig iron and scrap were melted in a 75-ton basic open-hearth furnace, where the dephosphorizing was done, and subsequently the deoxidizing and desulphurizing was done in two 40-ton basic-lined electric furnaces. A comparison of the physical results obtained from forgings made by this process with similar forgings made directly in an acid open-hearth furnace at the works of one of the leading industrial steel plants, noted for high-grade open-hearth steel, shows that the steel with the lower phosphorus and sulphur has the greater toughness and ductility. Transverse tensile test bars from electric steel, though having the same tensile strength and elastic limit as the bars from the open-hearth steel, have a much greater elongation and reduction of area.

The results given in the table were obtained on tangential tensile test bars. All forgings received a green annealing before machining; after machining they were quenched and drawn. The first impression on comparing these results is that the higher elongation and reduction of area are due to the low phosphorus and sulphur, as shown by the chemical analysis; all the other elements are approximately alike.

Effect of Phosphorus

It would be difficult to draw any comparison between the open-hearth and electric steel in regard to the phosphorus content. This element is in solid solution with the iron as a phosphide and the percentages are too small in both the open-hearth and the electric steel to denote any difference even with a microscope. The lower phosphorus in the electric steel might have a slight effect on the elongation, due to producing a somewhat smaller grain and decreased brittleness in the steel.

Effect of Sulphur

It has been stated by a recognized authority on the manufacture of steel that "the effect of sulphur on the cold property of steel has not been accurately determined but it is certain that it is unimportant. In common practice, the content varies from 0.02 to 0.10 per cent. and, within these limits, it has no appreciable influence on the elastic ratio and the elongation or the reduction of area." This statement probably relates to commercial steels tested longitudinally. In this case the sulphur, in the form of manganese sulphide, has been drawn out into thin shreds in the direction of forging or rolling and is not so easily noticed in the results of longitudinal test bars as it would be in the case of transverse bars. With the overbalancing

*Abstract of a paper to be presented at the February, 1922, meeting of the American Institute of Mining and Metallurgical Engineers in New York. The author is steel superintendent U. S. Naval Ordnance Plant, South Charleston, W. Va.

amount of manganese present in all the steels referred to in this article, probably no iron sulphide is present in the steel for none of the ingots showed any signs of tearing during forging. Steel containing iron sulphide is known to tear in forging and is termed "hot short" by steelworkers. Manganese sulphide has been described as being present in the ingot in the form of small globules between the grains of the metal. Having about the same fusing point as the metal, these inclusions become equally plastic when the ingot is heated for forging and are drawn out into long thin shreds—just as slag is drawn out in wrought iron. If, however, the amount of manganese sulphide present is not enough to form these globules, these shreds will not be developed in forging and transverse test bars will show as good results in elongation and contraction as longitudinal bars.

The following test bars were taken from a piece of steel resembling that shown in Fig. 3. Two of the bars were drilled longitudinal with the forging and the other two tangential. They were given exactly the same heat treatment, quenched at 1425 deg. Fahr., and drawn at 1200 deg. Fahr.; the results were as follows:

	Tensile Strength, Lb. Per Sq. In.	Elastic Limit, Lb. Per Sq. In.	Elongation, Per Cent	Reduction of Area, Per Cent	Fracture
Tangential..	111,500	55,500	21.3	44.5	Silky lipped
Tangential..	108,500	58,000	20.9	40.3	Irregular and woody
Longitudinal	109,600	58,500	24.1	55.3	One-half cupped silky
Longitudinal	109,400	59,700	24.1	56.3	Three-fourths cupped silky

It will be noted that the tensile strength and elastic limit are practically equal in the tangential and longitudinal bars, but the non-metallic inclosures in the steel caused the tangential bars to show a lower elongation and lower contraction than the longitudinal bars.

Table of Tangential Tensile Tests of Various Sized Gun Forgings of Open-Hearth and Electric Steel

	Phosphorus, Per Cent	Sulphur, Per Cent	Nickel, Per Cent	Tensile Strength, Lb. Per Sq. In.	Elastic Limit, Lb. Per Sq. In.	Elongation, Per Cent	Reduction in Area, Per Cent
Open - hearth steel*	0.04	0.039	2.98	98,013	57,720	20.4	36.9
Electric steel	0.012	0.008	1.16	95,435	64,010	24.5	58.3
Physical requirements				80,000	50,000	21.0	30.0
Open - hearth steel	0.040	0.044	3.02	104,785	73,162	19.6	39.4
Electric steel	0.012	0.009	2.81	96,995	67,785	24.2	55.9
Physical requirements				90,000	55,000	18.0	30.0
Open - hearth steel	0.039	0.040	3.09	103,185	73,231	19.2	39.9
Electric steel	0.014	0.012	2.87	100,340	72,610	23.2	52.5
Physical requirements				90,000	55,000	18.0	30.0
Electric steel*0.020	0.026	0.026	2.66	110,182	67,067	17.8	37.1
Electric steel	0.006	0.008	2.91	108,681	77,038	20.2	49.3
Physical requirements				95,000	65,000	18.0	30.0
Electric steel*0.020	0.025	0.025	2.65	95,245	64,979	19.3	37.0
Electric steel	0.014	0.012	2.87	100,340	72,610	23.2	52.5

*These ingots were made by a private industrial plant during the war.

The results in each case represent the average of 15 to 40 bars from 5 to 10 forgings.

Effect of Oxygen

There is nothing in the usual chemical analysis to show how much oxygen is present in steel. It exists in small amounts in even the best steel and has bad results. In large amounts, it produces tearing during forging or rolling, and when cold is brittle under shock. If present, it is probably in the form of iron and manganese oxide and silicates. Oxygen is most prevalent in basic open-hearth steel. In the acid open-hearth furnace a more effective reaction between the slag and the steel tends to deoxidize the steel more thoroughly. This cannot be done completely on account of the air present in the acid open-hearth furnace.

A condition exists in the basic electric furnace which cannot exist in the basic or the acid open-hearth furnaces. With a reducing atmosphere in the furnace, it is possible to form a calcium carbide slag free from metallic oxides; with constant rabbling of the bath, any oxides in the steel will rise to the slag, where they are reduced by the carbon present. The iron and manganese are returned to the bath, and the resulting carbon monoxide is liberated to the atmosphere of the furnace. Unless the slag and bath are free from oxygen, it would be impossible to maintain a carbide slag; and unless the slag and bath were thoroughly deoxidized, it would be impossible to retain the sulphur in the slag as calcium sulphide.

Hence, the conditions that bring about the elimination of sulphur from the steel guarantee that oxides and other metallic impurities have also been eliminated. This is demonstrated in the case of the last two forgings in the table. While the forgings were made by the electric refining process in different steel plants, the test bars of steels containing the higher sulphur, show no better results than the forgings made by the acid open-hearth process. The photomicrograph of the

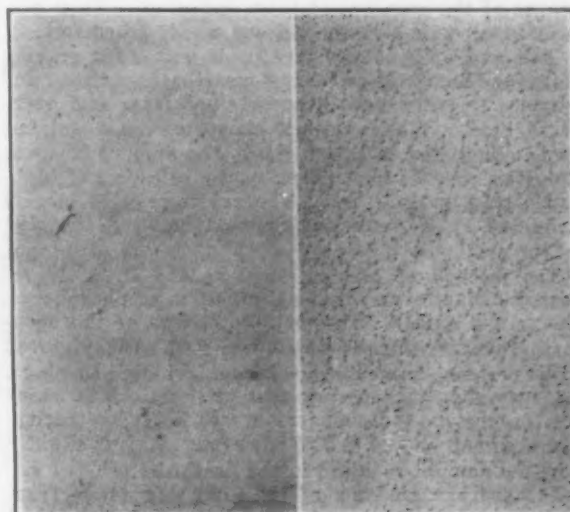


Fig. 2—Electric Steel with Low Sulphur, Left, Unetched, $\times 25$; Right, Unetched, $\times 200$, Both Reduced About One-Third. This represents a longitudinal section taken from a low sulphur electric steel forging 11 in. in diameter, 28 ft. long, 7½-in. bore, weighing 6000 lb.

The carbon was 0.28; manganese, 0.74; silicon, 0.140; phosphorus, 0.011; sulphur, 0.006, and nickel, 2.81 per cent. The physical tests (given in detail in the paper) showed superior results, particularly on tangential bars.

The forging was green annealed at 1600 deg. Fahr., rough machined and quenched at 1450 deg. Fahr. and drawn to 1190 deg. Fahr.

electric steel with high sulphur, Fig. 3, reveals more inclosures than the electric steel with low sulphur.

Photomicrographs of the Two Steels

Photomicrographs have been taken of bars picked at random from each of the three classes of steels described. The polished surface of these bars was parallel to the direction of forging. One set of photomicrographs was taken at 25 magnifications, so as to include as many inclosures as possible and to show their distribution. A second set was taken at 200 magnifications, to show the formation of the inclosures. It will be noted that the non-metallic inclosures in the steel with low sulphur and highest elongation and reduction of area are smaller than in the steel with higher sulphur content and the lowest elongation and reduction of area. All the inclosures in the low-sulphur steel seem to be of the same kind, whereas, in the acid open-hearth and electric steel with higher sulphur, there are two types—the small round ones and those that were elongated and drawn out in forging. The light colored elongated inclosures in the acid open-hearth steel are

probably a mixture of manganese sulphide, oxides and silicates.

Manufacture of Steel at the Ordnance Plant

From the foregoing physical results and substantiating data, it is evident that the presence of sulphur, oxides, and other non-metallic inclusions are detrimental to the ductility and toughness of steel. Where the best quality of steel is required, it is necessary to keep these impurities to a minimum. The basic open-hearth furnace eliminates the phosphorus but only slightly reduces the sulphur; the oxides must be eliminated by the addition of deoxidizers, such as ferromanganese, ferrosilicon, aluminum, etc., which are sometimes added to the open-hearth furnace and rabbled after the air is shut off but more frequently are added to the metal in the ladle. If added in the ladle, the reactions are incomplete and the products of combustion remain suspended in the steel, forming harmful non-metallic inclusions.

Gun forgings and other ordnance material, where transverse tests are required, have never been successfully made from basic open-hearth steel. The bars generally fail in elongation and reduction of area tests, because of the presence of these inclusions. They generally break with a laminated and woody fracture.

The acid open-hearth furnace is better for making steel free from oxides and non-metallic impurities, and ordnance forgings have been obtained from acid open-hearth steel. While neither phosphorus nor sulphur can be eliminated in this furnace, the amount of these impurities may be kept down by the selection of high-grade scrap and pig iron. The oxides may be largely eliminated by the effective reaction between the slag and the steel.

The method of making steel at the U. S. Naval Ordnance Plant aims for the elimination of phosphorus, sulphur and oxides. The metallic charge of the open-hearth furnace consists of 40 per cent basic pig iron and 60 per cent miscellaneous scrap, including turnings, crop ends, etc., up to 8 per cent of limestone is added with the charge and sufficient ore to lower the carbon to approximately 0.20 to 0.25 per cent., which is slightly below the amount required in the finished steel.

The average analysis of the final slag taken from the open-hearth furnace on 19 consecutive heats just before tapping is as follows:

SiO₂, 15.43 per cent; FeO, 19.27 per cent; Al₂O₃, 3.66 per cent; MnO, 8.02 per cent; CaO, 45.02 per cent; MgO, 6.37 per cent; P₂O₅, 1.80 per cent; S, 0.031 per cent.

The average analysis of the steel prior to tapping these same heats was as follows:

Carbon, 0.23 per cent; manganese, 0.26 per cent; silicon, 0.010 per cent; phosphorus, 0.007 per cent; sulphur, 0.015 per cent; nickel, 0.66 per cent; chromium, 0.00 per cent

After it is tapped from the open-hearth furnace into a 75-ton ladle, the steel is teemed through a 2½-in. nozzle into two 40-ton basic electric furnaces for de-oxidizing and finishing. Usually 2 lb. of 50 per cent ferrosilicon and 3 oz. of aluminum for every ton of steel tapped from the open-hearth are added to the ladle, to take up any oxygen present, which might lower the carbon content while the steel was in the ladle.

An average analysis of the slag left in the ladle from the nineteen heats, after teeming into the 40-ton furnace was as follows:

SiO₂, 17.27 per cent; FeO, 18.32 per cent; Al₂O₃, 5.75 per cent; MnO, 7.84 per cent; CaO, 42.79 per cent; MgO, 8.15 per cent; P₂O₅, 1.65 per cent; S, 0.028 per cent.

The average analysis of the metal as teemed into the electric furnaces from the open-hearth on the same heats was as follows:

Carbon, 0.20 per cent; manganese, 0.23 per cent; silicon, 0.037 per cent; phosphorus, 0.007 per cent; sulphur, 0.016 per cent; nickel, 0.67 per cent; chromium, 0.00 per cent.

A comparison of the steel analysis will show that the silicon increased slightly; also, that there was a slight drop in carbon and manganese while the steel was in the ladle. The average phosphorus content of the charge into the open-hearth was about 0.08 per cent, because of the comparatively low phosphorus in the crop ends.

After teeming the molten open-hearth steel into the 40-ton electric furnaces, a new slag is made up of burned lime, fluorspar, and ground coke. This represents, in weight, about 3 per cent of the metal charged and is added from time to time, depending on the condition of the bath and the consistency of the slag. The operation from now on is a deoxidizing one. Under normal conditions the bath is held from 3 to 5 hr. in a reducing atmosphere.

The finished steel on six heats showed the following analysis:

Carbon, Per Cent	Manganese, Per Cent	Silicon, Per Cent	Nickel, Per Cent	Phosphorus, Per Cent	Sulphur, Per Cent
0.32	0.71	0.250	0.36	0.022	0.009
0.36	0.74	0.241	3.03	0.013	0.008
0.29	0.74	0.238	2.78	0.010	0.007
0.35	0.71	0.200	0.31	0.013	0.008
0.38	0.67	0.210	2.97	0.010	0.008
0.30	0.78	0.215	2.83	0.013	0.010

The low sulphur in the final slag denotes the possibility of removing a greater amount from a steel of higher sulphur content from the open hearth. This would result from using a lower grade of scrap and pig iron with higher sulphur content in making up the charge for the open-hearth furnace. This might occur

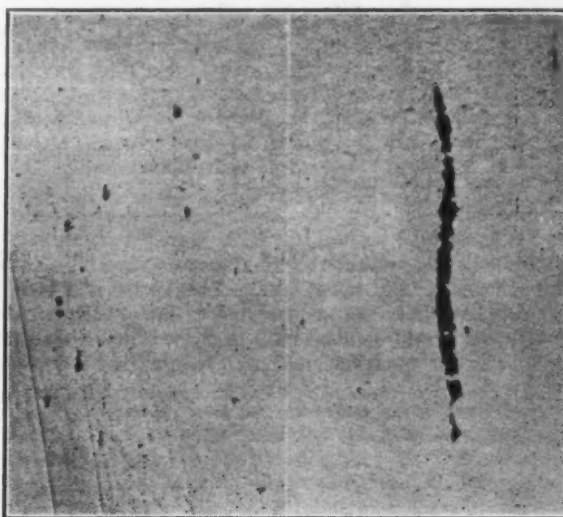


Fig. 3—Basic Electric Steel Made During the War in a Private Industrial Plant; Left, Unetched, $\times 25$; Right, Unetched, $\times 200$, Both Reduced About One-Third. This represents a longitudinal section taken from a basic electric steel forging 9 in. in diameter, 28 ft. long, ½-in. bore, weighing 4000 lb.

The carbon was 0.41; manganese, 0.48; silicon, 0.168; phosphorus, 0.026; sulphur, 0.029, and nickel, 2.60 per cent. The physical tests (given in detail in the paper) show results inferior to the other electric steel, particularly in ductility.

The forging was green annealed at 1600 deg. Fahr., rough machined and quenched at 1450 deg. Fahr., and drawn at 1220 deg. Fahr.

in plants where miscellaneous scrap is purchased in the open market and where crop ends are not so low in sulphur as those at this plant.

[A discussion of the reactions involved is given in the original paper.]

Conclusions

The manufacture of ordnance forgings from electric steel is not an innovation. It was tried, during the war, in a number of plants. Some of these plants were not as successful as others, probably because the managers were not sufficiently experienced in the many other phases of manufacture necessary in the making of ordnance forgings.

Steel made in an electric furnace will not be of the best quality unless all operations and reactions are performed completely and satisfactorily. Electric steel with its greater freedom from oxides and non-metallic impurities is more uniform, more homogeneous and more dense than ordinary open-hearth steel, and if it is cast at too high a temperature or chilled beyond a certain point in the mold, incipient cracks will develop. These minute cracks are radial and are most frequently

found near the center of the ingot or forging. Numerous electric steel plants working on ordnance material, during the war, were troubled with these defects, which from their physical appearance in test bars were called "snow flakes."

A diversity of opinion has always existed between the leading ordnance steel plants regarding the method of teeming steel into the molds. Some have consistently adhered to bottom pouring while others have claimed better results from top pouring direct, or through fun-

nels or boxes. The method apparently makes little difference if the steel is placed in the mold at the proper temperature and has been properly cleansed before teeming. Top pouring direct obviates the danger of getting runner brick into the ingot, which frequently occurs in the case of bottom pouring. It also obviates the danger of sand washing into the molds with the metal from the funnel or box. Bottom pouring will give a better surface on the ingot and for some purposes may be more desirable.

FRICITION IN ROLLING MILLS*

Effects of Proper Lubrication Shown in Reduced Power Losses

Increased production as high as 1½ per cent has been secured [under proper lubrication] with reductions of 10 to 12 per cent in the power necessary to drive the mill. In straight mechanical engineering practice, increasing the speed of the mill to secure greater productiveness must always be accompanied by forced increase of power. Forcing machines to operate at higher speed, by changing the size of the pulleys or even by putting dressing on belts so that they will have greater traction, always places an extra load on the main engine. In lubrication engineering, however, the savings are all made up of reductions of losses of friction and resistance, and of the loss or slippage in belt transmission.

Illustrating an extreme case of friction losses, a test on a 10,000-hp. reversing rolling mill engine in Germany is cited. It is only necessary to say here that lubrication of this large unit, as found, was representative of conditions which existed in steel mill practice some years ago, and unfortunately are sometimes found to-day. Changing the manner and method of lubrication gave the following results:

	Friction Losses			
Original r.p.m.	44.7	56.4	88	88
Original I. hp.	485.88	725.98	1,239.50	1,239.50
Later r.p.m.	42.8	57	79	88
Later I. hp.	148.49	178.72	224.39	249.95
Reduced I. hp.	337.39	547.26	952	989.66
Per cent	69.4	75.4	76.03	79.84

Analyzing these figures, it is seen that the original method of lubricating this unit gave results which approached the laws of solid friction; that is, while the surfaces were not apparently actually in contact, there was interspersed between them material of such a heavy nature that the resistance was so great as to approach the resistance of solid masses working upon themselves. As soon as lubrication was changed, the condition approached that given by consideration of the laws of fluid friction. It is, of course, quite impossible to secure, in a unit of this kind, either purely solid friction or perfect fluid friction. This test, however, indicates quite clearly a possible near-approach to each of these conditions, and represents what takes place in an extreme degree when lubricants are used that are entirely unsuited.

In this particular case the great resistance in the engine itself was reflected in the difficulty of handling the reversing levers. The reversing was done by auxiliary steam cylinders as well as by hand levers. It required a full opening of the throttle to the auxiliary cylinder and all of the power possible for one man to exert on the hand levers. After the change in lubrication was made, only partial opening of the throttle to the auxiliary cylinders was necessary, and the men operated the hand levers with the utmost ease. Further, it was observed and noted by the operators that the speed of the entire mill was increased. The engine was handled very quickly on the reverse, and would get up speed in a fraction of the time formerly required, and this mill was put from an ordinary,

average production unit to where it would make production records.

In this case all of the various rules shown in lubrication of spindles applied, as far as general lubrication was concerned. The lubrication of the steam cylinders, however, was handled through a new set of factors. The change which was made, and results obtained, in reducing the load of this part of the unit were entirely due to securing a better distribution of the lubricant, through having it properly atomized and carried with the steam where it could be spread upon all the surfaces with which the steam came in contact; whereas formerly large quantities of a heavy lubricant, not entirely suited for the work, were forced on the surfaces some seconds after the machine was placed in motion, and this oil would be worked back and forth on these surfaces in that form, resulting in much fluid friction. The oil fed in this manner would not spread to the upper part of the cylinders, which were undoubtedly, in consequence, operating metal to metal. Of the total 1250 hp. friction in this unit when it was turning 88 r.p.m., at least 50 per cent would be charged to cylinder and valve lubrication; the balance to the main bearings, pins, guides and connections.

The New Way to Success—A New Year's Address-

The following is in part a New Year's address given before the employees of the Chapman Engineering Co., by William Brewster Chapman, president:

The old way of attaining success was by taking advantage of others. The new way is by taking thought of others. The psychology of success is the psychology of human brotherhood. The most successful companies of the future will be those that express the most sympathetic human understanding, thus insuring the best team-work and producing the most power with the least friction.

The first step in success is co-operation and co-operation starts with tolerance. The best thing I've heard on tolerance was from a modern minister who said to his congregation "Leave off trying to make other people like yourself; one's enough." It's novel advice from the pulpit, but it's good.

Next to co-operation comes "Pep." It can be kept alive only by exercise, play, good food and a happy state of mind. Important as it may be what food we eat, of vastly more importance is the state of mind in which it is eaten. Joy is a great creative power, it is the keynote to a successful life. Act as though you were glad to be alive and the response will be a new realization of life itself.

My final suggestion is that if you want to get on, you must study more. A vast amount of special information is quite as necessary as special experience. If you neglect either one you impose a limit on your future.

The Surface Combustion Co., Inc., industrial furnace engineer and manufacturer, 366-368 Gerard Ave., Bronx, New York, have been awarded the contract for an automatic heat treating furnace to be installed at the naval ordnance plant, South Charleston, West Va. This is a furnace for heat-treating 16 in. armor piercing shells as per Navy Department schedule and specifications 8996 opened Nov. 22, 1921.

S. L. Fuller, chief engineer, John F. Casey Co., Pittsburgh, was the speaker at the regular monthly meeting of the Engineers' Society of Western Pennsylvania, at the William Penn Hotel, Pittsburgh, Tuesday evening, Dec. 20. His subject was "Construction of the Monongahela River Bridge at Fairmount, W. Va." This bridge is of reinforced concrete with three 250-ft. arches,

*From a paper by William F. Parlah, consulting lubrication engineer, Chicago, before the American Society of Lubrication Engineers, at its first annual convention, Chicago, Oct. 13.

New Horizontal Boring Machine

The Universal Boring Machine Co., Hudson, Mass., has placed on the market a new horizontal machine designed primarily for railroad shop and heavy work in general. It is offered as incorporating several features of improved design.

A conspicuous departure from the usual design is in the construction of its wide bed with three flat ways. The front and center ways serve as guiding surfaces, and the one at back supports the long carriage and correspondingly long and heavy standard table, the latter being 30 in. wide and 63 in. long. The machine derives its name, the original Tri-Way universal (horizontal) boring machine from this bed. The bed is rectangular and is so ribbed and braced, it is said, that even a slight degree of spring is prevented if the machine is not placed on a good foundation and properly leveled.

Large overhang on the table is eliminated, the electric motor and gear box, usually supported on brackets or overhanging, being embodied in the new machine. The generous width of the bed is intended to support the overhang of the work as well. The bed is also designed to accommodate the coolant system, the top sloping to the head end and the coolant running into a settling tank concealed in the end of the bed. From the settling chamber the coolant overflows into another tank, from which it is pumped direct, from the driving motor, to the work. In addition, the bed is provided with chip chutes from which the chips can be removed at the back of the machine.

All of the working mechanism is contained in the bed in two trays in one box, readily accessible in case any repairs are needed. The lower tray contains the speed mechanism, and the upper the feed gears. In the bottom tray the gears run in a bath of oil, the tray being provided with exterior oil gages as well as drain plugs. Oil is forced into the upper tray by the action of the gears in the lower tray. All changes are made on the sliding gear principle. The operation of the speed and the feed gears are identical, there being three levers arranged in a horizontal line for each tray, for locating speeds and feeds and for operating same.

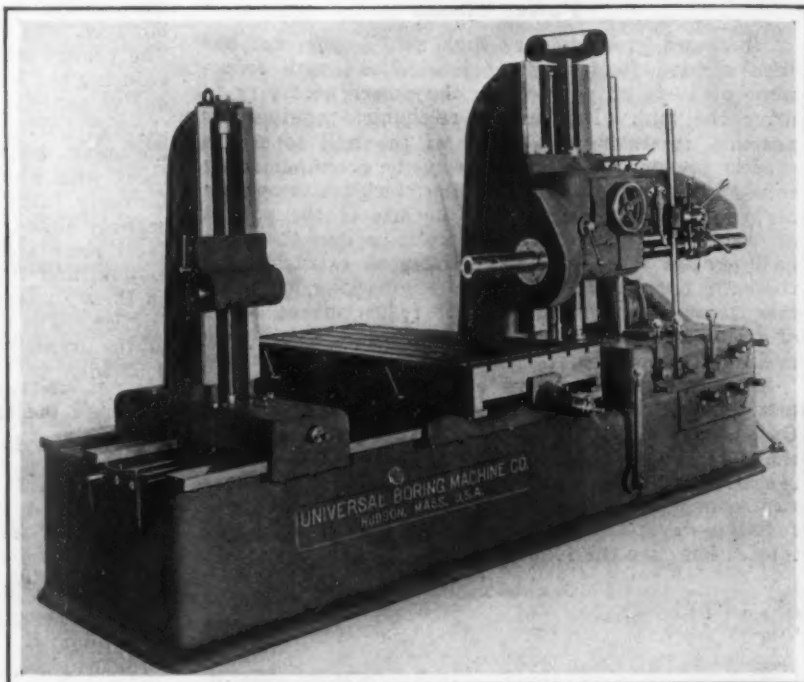
The starting and stopping lever, shown in front of the bed, is within easy reach of the operator's right hand. All levers are provided with ball handles. Both the feed and the gear mechanism is arranged in geometrical progression, a proper ratio of speed and feed for any kind of work being thus assured. There are twenty-four spindle speeds with a range of approximately 7 to 285 r.p.m., and twelve feeds, in either direction. Milling feeds run from $\frac{1}{4}$ in. to $5\frac{1}{2}$ in., and boring feeds from $\frac{1}{4}$ in. to 2 $\frac{13}{16}$ in. per minute. The driving gears are provided with a friction safety clutch, which can be adjusted to a certain horse power; which when reached, causes the clutch to slip out of place thereby releasing gears from excessive strain. All feeds are equipped with automatic stop motion.

In the company's other boring machines a rear post with the box travel in the center has been used, and more or less difficulty has been experienced in applying attachments on certain kinds of work. In the new machine the rear post is constructed along the same lines as the head, the box being on the side and having two bearings, as against four heretofore. The screw rod for raising and lowering the box in the old type of machines, is in one side of the rear post, whereas on the new machine it is in the center, thereby giving greater strength and accuracy. The compensating nuts for taking up wear in the elevating screw are shown at the

upper end of the screw. The beam post is in two parts, consisting of the base, which never need be taken from the bed, and the post itself, held in place by four bolts and two pins, and easily removable. A ring is provided in the top to facilitate removal of the post by hoist.

The head is simple in design, and is similar to the head on the company's No. 3 A machine. The new head, however, has a reversing lever for the boring bar, and a lever for throwing in the high or the low speed gear for the boring bar. The head rests on two ways having extra wide wearing surfaces.

The bar carrier on the bar is adjustable throughout and is equipped with ball bearings. The forward bearing in the spindle has an adjustable take-up sleeve and is lined with felt to assure continued clearance from dirt. The diameter of the main boring bar is $4\frac{1}{2}$ in.



The Front and Center Ways Serve as Guiding Surfaces, the One at Back Supporting the Carriage and Table

The taper hole in the main boring bar is a No. 6 Morse. The automatic travel of this bar is 30 in., but by resetting it can travel 60 in. and the length of the bar is 110 in. The power cross feed to the table is 48 in. and the power vertical feed to the head 30 in. The maximum distance from the table to the center of the bar is 30 in.

The machine occupies a floor space of 17 ft. by 9 ft. 5 in., is 8 ft. high and weighs approximately 20,000 lb. It is driven by an 18 in. x 4 in. pulley drive having 230 r.p.m. It can be driven either by belt or by motor.

Presentation to A. N. Flora

In recognition of his services during the past five years as president of the Western Sheet and Tin Plate Manufacturers' Association, A. N. Flora, vice-president in charge of sales of the Trumbull Steel Co., Warren, Ohio, was presented a chest of silver Dec. 23 by representatives of the organization. The gift consisted of a set of flat ware and a tea service. Charles B. Cushwa, general manager of the Brier Hill Steel Co., Youngstown, made the presentation, as chairman of the special committee handling the event. Other members of the committee were W. W. Lewis, general superintendent of the Falcon Steel Co., Niles; Warren F. Perry, assistant to the president of the Brier Hill Steel Co., in charge of industrial relations; D. R. Fithian, a superintendent of the Sharon Steel Hoop Co., Sharon, Pa.; L. E. Jurey, assistant to the second vice-president of the Republic Iron & Steel Co., Youngstown, and James H. Nutt, of Youngstown, for many years secretary of the association.

Electrification of Steel Plant Railroad

Difficulties Include Protection of Third Rail from
Hot Metal Spills—Saving in Cost 50 Per Cent
—Investment Offset by Low Operating Cost

—BY R. B. GERHARDT*

ELECTRIFICATION of the steel plant railroad probably offers the largest field for development of any existing to-day in our plants, and should carry attractive possibilities. Most of our plants use to some extent electric locomotives or motor cars, but this use has been limited to some particular piece of transportation, such as handling hot coke from the coke ovens to quenchers and screening plants, or handling hot ingots from soaking pits or heating furnaces to the mills. In all these cases great benefit results over steam operation, but it is the scope of this paper to consider the complete displacement of the steam locomotive and do all transportation and shifting with electric locomotives, which in the larger plants approximates regular railroad yard operation.

Electrification of main line railroads in this country has, in general, been for special purposes, such as to relieve congestion or for terminal work. Only a very few roads have electrified with the view of handling general freight and passenger traffic.

In practically all cases where roads have been electrified, a considerable economy of operation has resulted, and in all cases the electrification has permitted more dense traffic. Considering the electrification of steam railroads in general, the following items as regards economy of operation, in addition to the fixed charges on any investment undertaken, have to be considered:

Fuel and other operating materials.
Repairs.
Operating labor.
Locomotive depreciation.
Hostler or station service.

Fuel

Under this item the greatest saving can be shown in yard service, due to the fact that the steam locomotive in yard service is idle a much longer time than in any other class of service, and during this time the losses, figured back into fuel, are very considerably greater than with the electric locomotive, particularly where the energy for such electric locomotive is obtained from a general system of power. It has been pointed out also, under this heading, that there is no creeping paralysis gradually impairing the efficiency of the electric locomotive, until temporary relief is obtained through frequent boiler washings and shifter house tinkering, as the efficiency of this unit remains very nearly constant over the entire life of the equipment.

In addition to the above, the steam locomotive efficiency gradually drops off from wear in the piston rings, piston and cylinder walls. With electric operation, however, there are some chances of inefficient operation, due to transmission, distribution and track bonding losses, and it is essential that as careful inspection be given these points as is given the locomotive itself. From results obtained by the New Haven Railroad it has been shown that for every 106.8 lb. of coal required by a steam locomotive in yard service, 38.3 lb. of coal will do the same work after electrification.

This gives a ratio of 36 per cent for this class of service, but for yard work recent tests have shown that this ratio drops to 18 per cent, not taking into account coal lost in the steam locomotives by banking the fires.

With electric locomotives receiving their energy from a central power system, the cost of electric power

has to be compared with the cost of fuel for the steam locomotive. However, there are no coal and ashes to be handled; likewise, in the case of yard service no water. There is, however, some operating material, such as oil, grease and sand, required in both cases, but the items of oil and grease are much less with the electric locomotive. Along with the elimination of fuel, ashes, and water, there can be discarded, in favor of electrification, the plants required to handle these materials.

Repairs

Under this item the fundamental difference between the two classes of locomotives is the length of time required to make major repairs, except possibly in the cases of turning tires and painting. Spare parts can be so easily and quickly substituted in the case of the electric locomotives, that the time for so doing will greatly overbalance that required for most repairs on the steam locomotive. An armature, motor, gear or controller on the electric locomotive can almost be changed in the time required to cool down and empty a locomotive boiler safely for boiler repairs, not to speak of engine cylinder repairs.

With electric operation, where power is taken from the general power system, the cost of additional apparatus required for supplying current to electric locomotives, of course, has to be taken into account; likewise, an item under repairs to be considered, which does not enter into steam operation, is the maintenance of transmission, distribution and contact line systems. With electric locomotives, however, there are no restrictions imposed by outside boiler inspection. The following figures† indicate the locomotive repair cost for main line freight service:

	Steam Mallet	C. & St. P. Electric
Weight on drivers.....	240 tons	225 tons
Cost repairs per mile.....	60c.	14.65c.
Cost repairs per 100 tons locomotive weight on drivers.....	25c.	6.52c.

Operating Labor

In general yard work the train crews under electric operation do not differ from those under steam operation, except that the wages of the man taking the place of the fireman are usually somewhat less. For steel plant operation considerable additional economy can be effected as follows:

Each of the various departments, such as the coke ovens, open-hearth and mills, having considerable local shifter service, would be supplied an electric locomotive of its own to take care of such service, and the operating crews on these locomotives could be one man less than on locomotives in general service. These department locomotives would receive cars at a certain specified point from the yard department, deliver them to their destination in their own department, and return empty or loaded cars to the designated point again, for outbound or interdepartment handling by the yard department.

Locomotive Depreciation and Retirement

In the case of steam this is at an appreciably higher rate than in the case of electric operation. It is generally conceded that the life of a steam locomotive averages between 15 and 20 years, as against the life of an electric locomotive of 25 to 30 years. Substantiating this, I wish to point out that the electric loco-

*Electrical superintendent Bethlehem Steel Co., Sparrows Point, Md. The paper was presented at the Chicago convention of the Association of Iron and Steel Electrical Engineers.

†From paper read Oct. 22, 1920, before Joint New York meeting of A. S. M. E. and A. I. E. E.

tives on the Baltimore & Ohio tunnel, in Baltimore, are already in their twenty-sixth year of operation.

Hostler or Station Service

With electric operation this service is reduced almost to a minimum. As a matter of fact if the locomotives are so designed as to allow easy accessibility for inspection and oiling, the inspector can look after his work without necessitating the locomotive being sent to the station or shop, and the only requisite in the usual course of operation would be that the locomotive go to a specified point for taking on sand, when the supply is exhausted. No fire cleaning and rebuilding is necessary; likewise, fueling, watering and washing are done away with. The electric locomotive is always ready to run, and pull its maximum load, with the turning on of the current; while it is first necessary, with the steam locomotive, to get up steam pressure to do this work.

In the above conditions the electric storage battery type of locomotive has not been included, for the reason that a greater saving of electric operation over steam is shown by the use of straight electric locomotives only. If the storage battery machine is considered, each of the above items would be increased over straight electric locomotive operation except the item—operating labor.

For yard work the storage battery machine, especially since it can now be secured in fairly large size units, offers attractive possibilities due to the fact that no overhead or rail contact systems are required. But it is not able to withstand such rough treatment as the straight electric machine; it can not maintain continuous service, since during certain periods it must be idle for charging the battery, or else exchanging batteries, and there is a high depreciation on the battery itself. A combination machine using both line contact system and battery may be used, and considerable benefits derived over the straight battery machine.

Practically all of the steel plants use direct current power at a potential of 250 volts, and it is very essential, for simplicity and economy, to use this same voltage for the electric locomotive. In most plants it should be entirely feasible to do this, for the reason that direct current generating or converting apparatus is so distributed that long distances of transmission are not encountered. In many cases the combination of the general plant load, which is highly diversified, due to crane and mill operations, with the railway load will considerably improve the load factor on the direct current apparatus, so that, to handle the yard electrification, it would not be necessary to install such apparatus to the full capacity required for this work.

The principal objection to the overhead trolley in the electrification of steel mill yards is from the interference with the work of locomotive cranes. This machine is so essential in the yard that it is almost impossible to pick out any section of track where the crane will not be required to work, at some time or other. It may be proved, however, that such construction can be used to advantage in the general classification yards, and this is a matter for further study.

One other objection to the overhead trolley is that it does not lend itself very readily to heavy operation at as low a voltage as we propose to use, and we, therefore, feel that the most satisfactory system would be the third rail. After reaching this conclusion, the first question that naturally presents itself is the feasibility of a third rail in the yard from the following standpoints:

Safety.

Blocking the free passage of switchmen or other employees through the yard.

Danger from material or hot metal spilling or falling on the third rail.

Methods of crossing frogs and switches.

Methods of construction through buildings or special places where conductor rail is objectionable.

Tie-up from wrecks.

Safety

The best answer to the question of safety is to refer to the operation on blast furnace trestles, where we have had electrified tracks with third rail construction

for many years, operating at the same voltage as proposed for yard electrification. Looking over our records during this time, I find that there has not been a single accident from contact with the live rail. There have been accidents on the trestle due to other causes, but none can be attributed to the electrified condition of these tracks.

Two hundred and fifty volts is the common plant voltage which our workmen are thoroughly familiar with, and particularly the yard department employees who have anything to do with locomotive cranes or handling of lifting magnets. If we should go to any higher voltage, then the proposition would be considerably more hazardous.

There are essentially two kinds of third rail contact systems, one using the over-top contact and the other underneath contact. We prefer the latter for steel plant work, due to the fact that it can be better insulated and more substantially protected from material falling into the rail and causing trouble. With this type of construction, it is almost impossible for anyone to come into contact with the live rail, except by getting down underneath the guard on either side and touching the head of the rail, which extends slightly below the guard; whereas, with the overtop contact there is not formed nearly as good a support for the guard and anyone stepping on this guard or anything falling on it is apt to break through and come in contact with the live rail. Also, it is entirely possible to come in contact with the rail from the side toward the track, where it is entirely exposed.

The underneath contact system lends itself more readily to a very close fitting guard, thus taking up considerably less space than the overtop contact rail with guard, and this close fitting guard can be purchased on the market, made up of impregnated insulating material in sectional lengths, which fit the rail exactly and require no supporting straps or brackets. The labor of installing or repairing such a guard is, therefore, reduced to a minimum. Such construction has been in satisfactory use for quite a number of years on the New York Central electrification in New York, also on the Philadelphia Rapid Transit system.

Blocking Free Passage of Switchmen or Other Employees Through the Yard

The type of third rail construction described above makes it very feasible to step over the rail without hazard of shock and without strenuous effort. Also, in crossing the rail, there is no danger in actually stepping on the guard, which will easily support just as much weight as the rail itself. At any point where it is desirable to do so, a gap of approximately 40 ft. can be left in the rail without interfering in any way with operation. Thus at road crossings there will be no difficulty, and at other necessary points such gaps can be allowed.

Where two or more tracks run parallel, the conductors' rails are located toward the inside of these tracks, so as to leave the outside area free of obstructions to the switchmen and brakemen. With electric operation the locomotive has operating control equipment on each side of the engineer's cab, so that he can use either side of the locomotive as desired.

Danger from Material or Hot Metal Spilling or Falling on Rail

With the type of third rail construction described above no material falling on the conductor rail guard will do any damage, unless it is actually heavy enough to cut through $\frac{1}{2}$ -in. impregnated insulation. To do such damage a piece of steel falling from an ordinary flat car would have to weigh between 1000 and 1500 lb.

As regards hot metal spillage, unless the metal should build up a sufficient puddle to burn the railroad ties, no damage would be incurred to the third rail, except in a case where a stream of hot metal might pour direct from a ladle continuously down over the guard, the ladle standing in one spot. Even this would not prevent the locomotive from operating, as the guard only would be burned off, and inasmuch as the trouble would be in a particular spot, repairs would necessitate only renewing the guard at this point.

We should not propose running the conductor rail up alongside of any of the blast furnace cast houses, where hot metal and slag messes often occur, but would stop the rail at the end of the cast house. It would be necessary for locomotives in this class of service to use an idler car, the same as under present operation, to reach ladles standing under pouring troughs.

Methods of Crossing Frogs and Switches

On a general first glance at a steel plant railroad yard, the complicated track system, with numerous switches and cross-overs, would seem to make third rail operation not practical. However, one needs only slight study of the situation to overcome these doubts. On many furnace trestle electrified tracks we have solved these difficulties, and we can easily improve on such systems, as there are considerable difficulties to contend with there, due to spillage of all kinds of raw materials and scrap down over the tracks, which would not be the case in general yard work.

By using four collector shoes, one at each corner of an electric locomotive, and by the use of the side approach conductor rail fitting at switches, it is entirely possible to keep current on the locomotive, even at most difficult track positions. Where gaps must necessarily occur in the conductor rail, it is only a matter of getting the proper distance between collector shoes, to solve the problem.

Methods of Construction Through Buildings or Special Places Where Conductor Rail is Objectionable

It is easy to provide on each electric locomotive a cable reeling device or power driven take-up reel, with about 500 ft. of flexible cable to be used in buildings or special places where conductor rail is objectionable or prohibited. At such places a receptacle should be mounted where one of the train crew could plug in the end of this flexible cable, and the locomotive would proceed on its way to deliver or remove a train from such buildings, as in the case of a locomotive maneuvering in the open-hearth pit, or going into any one of the other plant buildings.

In the open-hearth scrap yard, one track, the running track straight through the yard, would be provided with the third rail, with a guard construction over it, made of steel. The other track up against the scrap pile would not be electrified, but cars would be handled on this track in a train as far as possible, or by poling them from the running track, so as not to make it necessary for the locomotive to run along the track, which is apt to be blocked up with scrap metal. In the cinder dump, the pay-out reel and flexible cable described above would be used on the dumping track, and as regards steam for dumping the cinder ladles, air would be supplied instead from the locomotive, which would be equipped with a reservoir sufficient to handle the cinder ladle dumping cylinders.

Tie-up from Wrecks

The extent to which any section of the yard might be tied up from a wreck causing damage to the third rail depends entirely upon the degree to which the conductor rail system is sectionalized. These sections, in a dense traffic zone, might be slightly less than 500 feet, so that by using the pay-out reel with flexible cable described above, the locomotive could easily maneuver, in case of a wreck, over the dead conductor rail section. The only time the system would be out of power would be long enough to close a circuit breaker and switch in the power house, or any of the sub-stations.

To make a comparison between steam and electric operation on any particular proposition, accurate results require a service data test on one or more of the steam locomotives to be replaced in each class of service. Such a test, lasting three days last February, and made with a 115-ton locomotive having 75 tons on drivers, gives data on a steel mill yard locomotive in typical service of handling incoming and outgoing freight. This work is of a variable nature, as cars are spotted and collected all over the yard.

The heaviest trailing load handled was 1,330.5 tons, while most of the work consisted of considerably lighter shifts. The number of shifts per day is 88,

while the per cent of time idle, lost in throwing switches and making couplings, is only 40 per cent of total time. From comparison with other tests, it has been found that a locomotive working its maximum all day will vary its per cent time lost inversely with its length of shift. The average length of shift on this work was 1,682 ft.

Since the average load was only 199 tons, the trailing load could have been larger, and more work or ton miles could have been accomplished, but the time lost would have remained no less and probably some greater. The total mileage per day averaged 26.6 miles, which gives the average speed per shift at 5.1 mph. The trailing ton miles, which represent the effective work accomplished by the locomotive, were 3,530.4, while the locomotive ton miles expended to accomplish the effect were 3,064. The locomotive ton miles represent 46.5 per cent of the gross or total ton miles.

As the locomotive ton miles are ineffective ton miles, the shifting may be said to be only 53.5 per cent efficient. The tender ton miles averaged 1,010.3, and are the ton miles necessary only to supply fuel to locomotive. Trailing ton miles should be used as a basis for any calculations, since this value is the effective work, hence the amount of coal used to accomplish a trailing ton mile was 1.122 lb.

To give some idea as to what results might be secured after electrification, the figures below represent a case under study for some time past. They give actual steam operation costs averaged over a period of several years, against estimated costs with electric operation:

	Steam	Electric	
		Battery Locomotives	Straight Electric Locomotives with Third Rail
Number of locomotives...	27	27	23
Investment charges, including shop and service facilities, converting apparatus, transmission and contact systems	\$850,000	\$1,220,000	\$1,376,000
Fixed charges per annum	99,300	105,300	164,800
Locomotive depreciation ..	20,400	163,400	23,700
Fuel or power	116,100	28,000	18,900
Repairs	140,700	36,000	28,800
Operating labor	147,500	89,500	89,500
Station service, including miscellaneous operating material	43,000	16,000	9,400
Totals	\$567,000	\$438,200	\$335,100
Annual saving, compared with steam		\$128,800	\$231,900
Return on investment, in addition to normal interest included in fixed charges		10.5%	16.9%

This proposition covers a steel plant railroad yard having a total of 57 miles of single track. There are 27 steam locomotives ranging in size from 75 tons down to 25 tons, and it is assumed that 27 battery locomotives with extra battery units, or 23 straight electric locomotives, using third rail, would be required to do the same work. For standardization purposes and flexibility of operation it is assumed that electric locomotives would either be 40-ton or 80-ton units, each of the latter being made up of two of the 40-ton machines. This would mean a total of 37 of the 40-ton battery locomotives or 33 of the 40-ton straight locomotives to be considered. The figures given under electrification for investment charges really represent the net cost after an allowance has been made for the salvage value of the steam locomotives displaced.

These figures really show only part of the saving that can be made by electrification. After the yard is electrified (with third rail system) the next step is to equip the locomotive cranes for motor operation, and these machines could work in any part of the yard through the full 24 hr. of the day, if desired. The greatest item of saving in this case shows up in the additional amount of work which can be secured from these units, for with steam operation, present experience has shown that a general average of 50 per cent of the time is lost, due to the cranes having to drop their work and go for fuel or water. In some cases it is true that these items can be secured without any great movement, and in other cases many hours are lost for the same purpose, but in either event it is

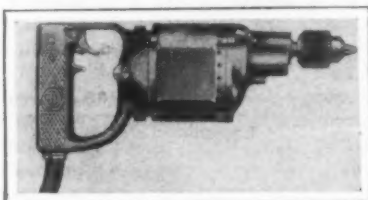
true that the cranes cannot continue with their work while taking on these requirements. It is rather hard to figure just what saving can be effected, without making an extensive investigation over quite a period of time, but for the case cited it is estimated that \$70,000 annually would be conservative for an average of ten cranes in operation. This would bring the annual saving in favor of electrification up to over \$300,000, cutting the cost over the present method of operation by almost one-half.

It would appear, therefore, that the general subject of electrification of the steel plant railroad is one which merits investigation and study, and the writer predicts that the electric motor will displace the steam engine on mill transportation systems just as it has in rolling mills.

Light-Weight Portable Electric Drill

A lightweight, $\frac{1}{4}$ in., portable electric drill of the type shown in the accompanying illustration and designed for drilling in metal or wood has been added to the line of the Black & Decker Mfg. Co., Baltimore.

The drill has an aluminum-alloy housing and weighs but 5 lb. It has double reduction gearing giving a no-load speed of 1600 r.p.m. Gears are stub toothed, cut from chrome nickel steel, heat treated and run in grease. Bearings are removable and renewable. The drill is equipped with a pistol grip and trigger switch, with the switch located in the handle to enable close corner work. The brushes can be renewed from the



The Spindle Is Arranged to Enable Drilling to Within About an Inch of Any Obstruction

outside of the case and by removing four screws the motor commutator, switch mechanism, field leads and cord terminals may be exposed. The commutator end bearing of the motor armature is carried in a spider, which is integral with the motor case, keeping the armature in alignment and facilitating inspection and cleaning of the commutator while the drill is running, as the removal of the cover plate does not interfere with the operation of the tool.

A light weight rubber covered cable is supplied and a clamp provided in the handle so that strains on the cable have no tendency to pull the terminals loose from the switch. A 3-jawed chuck, flexible cord and attachment plug are supplied with the tool.

Will Dispose of Hog Island Scrap

Washington, Dec. 27.—With the 110,000 tons at Hog Island the only considerable lot of surplus steel it has on hand, the Emergency Fleet Corporation has begun plans to dispose of this tonnage. It has announced that it will receive bids until Jan. 5, on a private competitive basis, for all fabricated and partly assembled material included in what is known as group 8 at the Hog Island yard. This involves 6,000 tons, of which 95 per cent is built-up members, the remaining 5 per cent being fabricated but not assembled material. The other portions of the 110,000 tons at Hog Island will be sold in groups from time to time.

The steel is to be sold "as is" and no claim for condition or quality will be allowed after the opening of bids. Bids are to be addressed to the United States Shipping Board Emergency Fleet Corporation, Nineteenth and B streets, N. W., Washington.

The National Association of Cost Accountants has inaugurated a drive for 400 new members by March 1, 1922. The organization has local chapters in the principal cities of the United States. The chapters meet monthly to hear papers on cost and accounting problems. S. C. McLeod, 130 West Forty-second Street, New York, is the national secretary and business agent.

Metals for Aeronautics

In the seventh annual report of the National Advisory Committee for Aeronautics, reference is made to the report of the sub-committee on materials for aircraft. Many subjects have been studied, including streamline wire, screw threads, steel strip and light alloys, etc. Some of the difficulties mentioned relate to the effect of vibration, the difficulty or practical impossibility of obtaining proper heat treatment of thin steel sheets or strip on a commercial scale, and certain difficulties in connection with welding.

Progress made during the past year in the development of all metal aircraft has not been altogether satisfactory. The trouble seems to be that, as yet, we have not developed suitable and economical methods of producing and fabricating aluminum alloys. The Bureau of Standards expects to conduct a series of investigations on the rolling and shaping of duralumin for aircraft construction, and has been equipped for this purpose. Heat treatment of the material will also be carefully studied, in connection with the results of cold working. Fatigue tests are to be continued, and vibration tests to be made on various types of airplane, to obtain some idea of the character of vibration to be expected.

A most serious drawback of the present type of airplane is the cost of manufacture and the short life. This cost is excessive, even in quantity production. If construction materials consisted entirely of metal, the parts would lend themselves better to quantity production, longer life would be assured and storage conditions improved.

The committee's estimates for carrying out its program total \$265,000. Additions for publications and the collection, classification and dissemination of scientific and technical reports and data, together with administration of the Washington office, will add \$76,000, making a total for the fiscal year 1923 of \$341,000. This compares with the appropriations for 1921 and 1922 of \$200,000 each year.

Long Range Planning of Public Works

Washington, Dec. 27.—Announcement has been made by Senator Kenyon, chairman of the committee on Education and Labor, that he will attempt to get action soon after Congress reconvenes in January on his bill embodying a portion of the recommendations made by the national unemployment conference. It deals chiefly with long-range planning of public works to overcome cyclical periods of business and industrial depression.

The bill was reported to the Senate last Thursday by unanimous action of the committee following a brief hearing on the measure. Members of the committee are of the opinion that it provides a partial remedy toward offsetting the slumps in employment and giving more stability to the situation.

All witnesses who appeared before the committee gave strong support to the measure. Among them was L. W. Wallace, secretary of the Federated Engineering Societies. Brig. Gen. R. C. Marshall, Jr., former head of the construction division of the Army, now general manager of the Associated General Contractors, pledged the support of that organization.

Portland Cement Production High

Figures of the United States Geological Survey show that the production of cement for the first eleven months of 1921 amounted to 91,734,000 bbl., and shipments to 91,354,000 bbl. This latter figure is about 1 per cent under the record shipments for the first eleven months of 1920, and about 9 per cent greater than the average for the first eleven months of years 1917 to 1921. Production of cement during November, amounting to 8,921,000 bbl., is a falling off from the record figure of October, 10,506,000 bbl., but is about 17 per cent higher than the average November of years 1917 to 1921 inclusive. Production for eleven months was only one-half per cent below the high record of 1920, and is 11 per cent greater than the average.

BRAZILIAN CONDITIONS

W. Vernon Phillips Comments on Situation in That Country as Affecting Our Trade

W. Vernon Phillips of F. R. Phillips & Sons Co., Pennsylvania Building, Philadelphia, who has just returned from a trip to Brazil, comments as follows on conditions there as affecting the demand for American products:

"During a three weeks' stay in Brazil (that is Rio Janeiro and Sao Paulo) I gathered no outstanding impression. I came in reasonably close contact with Brazilians of the better class, English, American and Italian merchants and manufacturers.

"I am most impressed by the evident independence of the Brazilians in so far as foreigners are concerned. They feel sufficient unto themselves as, in fact, they will be in a very short time. Unlike Europeans (except in the case of importers and exporters) they find no need to learn other languages. In this they are like Americans. They have comparatively few visitors and the bulk of the population resides very far from the borders. Curiously, while her neighbors all speak Spanish, the Brazilian with his rather unpleasant Portuguese tongue thoroughly dislikes Spanish and while he can probably read enough of it to understand, he absolutely refuses to read catalogs, letters, etc., sent him in Spanish; in fact, feels quite indignant. Americans endeavoring to trade in Brazil should bear this in mind.

No Color Line

"The population is principally negro, but no color line is drawn and it is difficult to tell what proportion is pure white. This blending of color, however, has not been as serious in its consequences as we regard the possibility in the United States as in a large measure the colored element, given equal opportunity, has arisen to the occasion and many black men occupy most important positions with great credit. However, the rank and file throughout the country are much like our Southern negroes, working only as long as they need money, which is not often. The climate requires but little change in clothing and food is often to be had for the effort of picking it. So that probably the greatest need is emigration of Europeans. Germans are particularly welcomed for their thrift and ambition.

"The next important need is increased railroad facilities tapping the rich lumber, ore, rice and cotton sections, and it is only the lack of capital and the present international depression which prevent this expansion, as the government is ambitious and has very far reaching plans which include the development of water power which they have in great abundance to electrify their railroads and operate their manufacturing, which are extensive, in Sao Paulo and Rio Grande du Sul. This will free them from the yoke of coal which must all be imported, though they do mine a couple of hundred thousand tons of very low grade coal per year.

Shipping Facilities

"The shipping facilities in Rio de Janeiro and Santos are splendid and can take care of a heavy trade movement, Santos for the enormous copper export and Rio for general cargo, but they are also developing an excellent port in the North, namely Ceara which will take care of cotton, cottonseed oil, rice and lumber when finished. Also the banking facilities are adequate; in fact, more than can possibly be properly occupied excepting when business is at its apex. Foreign banks predominate and every country is amply represented. The banks, however, are strong as during the collapse last year only one bank (French) had to close its doors, though many scores of merchants were forced to the wall through the terrific fall in exchange and loss in values.

"The American naturally looks upon the milreis as depreciated currency, but the Brazilians continue to regard it as a unit of value and blame the high cost of the dollar and with certain good reasons. The milreis still has approximately the same purchasing power that it had before the war, wages have not advanced much and a milreis still brings a pound of food and

three of them normally purchased one American dollar, but to-day it requires eight of them, whereas it will buy 1.85 in francs as against 1.75 normally and three lire as against 1.75 normally, though it takes 33 milreis to buy a pound of sterling as against 15 milreis normally. So the pound costs them twice as much and the dollar three times as much, whereas they can buy a larger number of French and Belgian francs and Italian liras than formerly. Thus trade is naturally drawn by the countries whose exchange is most greatly depreciated. Moreover, Brazilians seem to prefer dealing with the Continent. The United States has, of course, suffered severely in reputation from the actions of unscrupulous exporters and indifferent manufacturers during the war, and we not only have to live this down but overcome a natural prejudice also. Present conditions give no opportunity to do this in the bulk of their purchases, as the Belgians, Germans and French can undersell us so greatly that the Brazilian thinks it hardly worth while asking us for prices. However, this will be overcome in time by readjustment in exchange and the Americans should not let up for a moment in keeping before the buying public, as it offers one of the greatest natural opportunities in the world with its great potential possibilities.

Governmental Protection

"One thing will be all important in the development of this trade and that is good governmental protection, particularly for those making long time loans, bond issues, etc., and this protection may have to be in the form of a demonstration of strength—a strong show of naval force will do much more than all the argument in the world with these people who are used to being kept in order by a show of force.

"The political situation is very unsettled and street disturbances are of frequent occurrence. The president is popular and is generally respected, but his proposed successor is very unpopular. They have no fixed parties in Brazil, so the administration always has a very great advantage with its great host of hangers on and petty officials, including the principal railroads, steamship lines, etc., so that the opposition is unorganized, is without authorized leaders and can only voice a protest through street demonstrations and the uncontrolled newspapers. The administration always has the army and police and very effectively controls the opposition. Thus the only effective way of ousting the party in power is to successfully engineer a revolution, which is not as bad as it sounds, as it simply changes those in control, but is pretty sure to result in some loss of life. The present situation will probably be saved by the selection of a third and acceptable candidate but without a revolution the change in the presidency means no change in the control, which is, as usual, held by a few strong men."

Grain Side of Belts More Efficient

Under reasonable shop tension, the flesh side of a leather transmission belt, when placed in contact with the pulley, will average only 50 to 60 per cent as much horsepower as the grain side. At higher tensions the flesh side will do better, averaging from 50 to 100 per cent as much power as the grain, depending on the belt, the tension and the conditions of service. This is the conclusion of the Leather Belting Exchange, Philadelphia, which conducted experiments in the research laboratory at Cornell University.

For more than two months continuous tests were performed. Use was made of five 4-in. single belts, 30 ft. long, of different manufacture. They weighed from 16 to 18 oz. Conditions were standardized. All belts were run long enough before the experiments to insure that they had become thoroughly "run-in."

Illustrating the less degree of efficiency of a new belt, one belt under test transmitted 12 hp. when first put on the pulley at a slip of 1.2 per cent; after five hours running it reached 19 hp. with the same percentage of slip and same tension; at the end of 13 hours it transmitted 24 hp.; after 20 hours, 31 hp., with a slip of 1.6 per cent. According to horsepower tables its scheduled transmission should have been 26 hp.

Double-Head Grinder for Finishing Wrist-Pin Holes in Engine Pistons

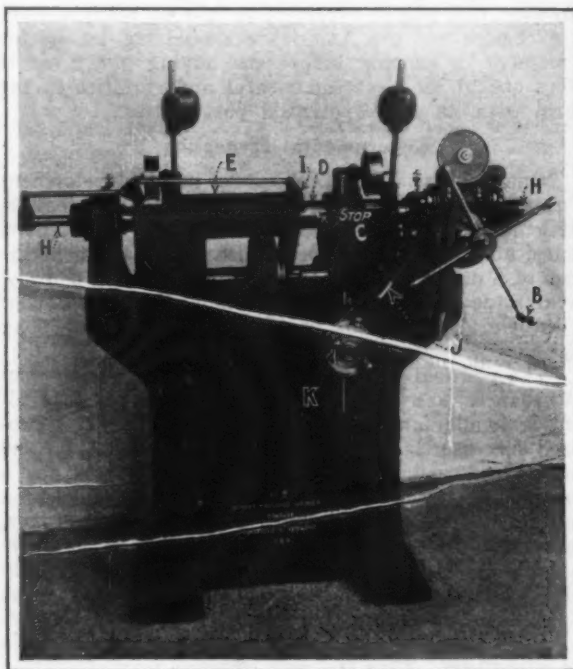
A double-head internal grinder designed for finishing wrist-pin holes in engine pistons, but adaptable also to the grinding of holes in opposite ends of long pieces not conveniently handled with a single long wheel spindle, has been brought out by the Bryant Chucking Grinder Co., Springfield, Vt.

The machine, designated the No. 2, resembles in its main features the company's other grinders. Two separated grinding wheel heads, carried on the same wheel slide, operate to grind simultaneously the two holes in opposite sides of pistons. The grinding wheels are dressed by a diamond, absolute duplication in size of both the ground holes being guaranteed. Both wheels grind at the same time. A single motion of the pilot wheel serves to separate the grinding wheels clear of the work, which permits of swinging the wheels back

wrist-pin holes, the plug being of a size to fit the holes before they are ground.

With the piston in place ready for grinding, the wheel heads are swung down in position. To bring the wheels into position for simultaneous operation, it is merely necessary to turn hand wheel "B" shown in the front view. Slide "C" is attached rigidly to slide bar "D". Slide "E" moves longitudinally on the slide bar and is prevented from rotating on the latter by a bar at the rear. This bar allows longitudinal movement between the two wheel head carriers but keeps the wheels in line. This relative movement of the slides is obtained by means of racks which operate through bar "H".

As the wheels are advanced toward each other the crank arm "I" strikes a stop and clamps the slide to the bar in proper position—all this being obtained by one movement of the handwheel. Dropping the lever "J" throws out one rack, the two wheel heads then being operated as a single unit.



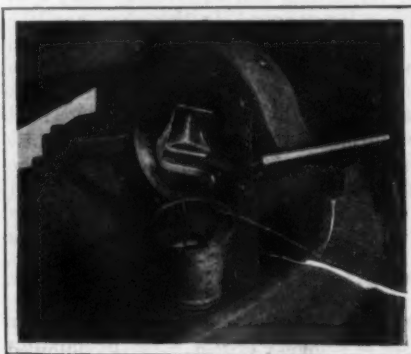
Two Separated Grinding Wheel Heads Operate to Grind Simultaneously the Two Wrist-Pin Holes in Opposite Sides of Pistons

out of grinding position and gives ample room for plugging and chucking the work.

Grinding the separated holes in pistons in this manner, at a single chucking of the work, assures absolute alinement of the ground surfaces, it is claimed, and also maintains a maximum length of bearing surface in each hole. Each hole is straight, there being no bell mouth at either end. Both sides of the piston are available for plugging or sizing the holes. The net result of this method of grinding two holes at the same time is to increase production; it is said to give higher accuracy and a piston capable of longer service.

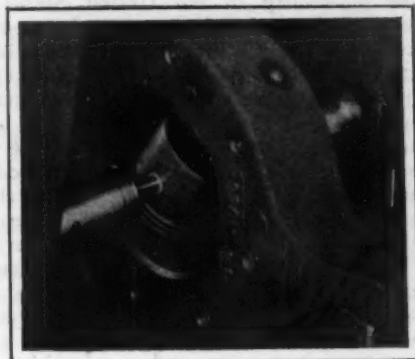
In the illustration of the front view, the wheels are shown withdrawn from the hole preparatory to swinging the wheel head to the rear for gaging or changing the work. In the work fixture, shown at about the middle of the bed, the piston is located in V's and held by a clamp which operates against the inner surface of the piston over its contact points with the V's. The clamp is operated by a half turn of a wing screw. In the body of the fixture there is a ball race which serves as a control for the rotating part of the chuck. The rotating ring is held in place by a ball-thrust bearing which in turn is held in place by a ring. The work is driven from the countershaft by a round belt.

The open side of the chuck with the piston removed, showing the clamp in position for gripping the work is shown in a separate illustration. To locate the piston the skirt is slipped under the clamp. The hand-centering, plug shown, which fits the hole in the closed space of the fixture, is put in place and passed through the



Open Side of Chuck with Piston Removed Showing the Clamp in Position for Gripping the Work. To locate the piston the skirt is slipped under the clamp

Open Side of Chuck with Piston in Place for Grinding. Both sides of the piston are available for plugging or sizing of holes



The wheel traverse when grinding is provided for by a "load and fire" mechanism with reversing stops adjustable to give the desired length of stroke, the same as used on the standard Bryant grinders.

The cross feed is obtained in the manner usual with Bryant internal grinders, by means of handwheel "K" at the front of the machine. This operates against the control plate clamped to an arm on the wheel slide at the back of the machine. The cross feed is utilized also for cross feeding the wheel when trueing.

The chuck range includes pistons up to $4\frac{1}{2}$ in. in diameter by $4\frac{1}{2}$ in. in length. The work spindle runs at 250 r.p.m. and the drive pulley on the countershaft at 750 r.p.m. The motor recommended is 3 hp. 1720 r.p.m. The weight, with countershaft, is 2300 lb. net and the floor space occupied, 3 x 6 ft.

The Otis Steel Co., Cleveland, is installing at its Riverside plant, complete galvanizing equipment, including sheet galvanizing machines, two galvanizing pots, cooling wheel, pickler, etc., furnished by the Erie Foundry Co.

The American Supply and Machinery Manufacturers' Association has accepted an invitation to meet with the Southern Supply and Machinery Dealers' Association at Birmingham, Ala., April 24 to 26, 1922.

Declaration of Government Policy Expected

Attorney General Daugherty and Secretary Hoover Giving Close Study to Supreme Court Decision in Hardwood Association Case

WASHINGTON, Dec. 27.—Determination of a definite policy by the Government toward trade associations is expected to be reached in the near future as the result of the Supreme Court decision in the case of the American Hardwood Manufacturers' Association. This is based on the statement by Attorney General Daugherty that the formulation of such a policy has been awaiting the decision. He is engaged in studying it carefully and has said that it affords a "clear path" for the conduct of such associations, but has not as yet given it sufficient analysis to announce a detailed policy. In co-operation with Secretary of Commerce Hoover, the Attorney General has for some time been considering the subject, but it was concluded to await the decision before mapping out a program which would provide a safe guide as to the conduct of such association.

Secretary Hoover's Attitude

Secretary Hoover, while attempting no interpretation of the decision, inasmuch as this does not come within his province, has expressed the belief that the Supreme Court's opinion will make it possible to work out a concrete program at an early date. The Secretary does not consider the decision to be so sweeping as do some attorneys who closely followed the case and thinks it will not interfere with co-operation between his department and trade associations. He stated that a survey conducted by the department showed that of the 1700 or 1800 trade associations of the country less than 10 per cent were shown to be engaged in "trade recruiting" in violation of the law.

His view is not shared by those attorneys who consider that the decision has such a range that it destroys the very principles of trade associations as to the handling of trade information, other than that relating to prices. There is no doubt on the latter point, in the opinion of legal authorities. Exchange of price information is held to be clearly in violation of the Sherman anti-trust law. But some of them go much further and maintain that the opinion handed down through Justice Clarke is much more restrictive.

Declared a Misnomer

They point to the following portion of the decision:

To call the activities of the defendants, as they are proved in this record, an "Open Competition Plan" of action is plainly a misleading misnomer. Genuine competitors do not make daily, weekly and monthly reports of the minutest details of their business to their rivals, as the defendants did; they do not contract, as was done here, to submit their books to the discretionary audit and their stocks to the discretionary inspection of their rivals for the purpose of successfully competing with them; and they do not submit the details of their business to the analysis of an expert, jointly employed, and obtain from him a "harmonized" estimate of the market as it is and as, in his specially and confidentially informed judgment, it promises to be. This is not the conduct of competitors, but is so clearly that of men united in an agreement, express or implied, to act together and pursue a common purpose under a common guide that, if it did not stand confessed a combination to restrict production and increase prices in interstate commerce and as, therefore, a direct restraint upon that commerce, as we have seen that it is, that conclusion must inevitably have been inferred from the facts which have been proved.

It is the opinion of some attorneys that the foregoing reaches far beyond the question of price, although leading up to it, and that it implies violation of the law in handling data such as those bearing upon stocks, production, etc., where the figures are used to restrain trade and fix prices. Concession is made that a test will prove that in individual cases there will be shown a marked difference in methods of conducting trade as-

sociations and that many will not come under the ban of the law. Meanwhile, however, there is widespread opinion that until the Government has mapped out a definite policy, many associations will feel so uncertain as to their legal standing in the light of the decision that they may decline to co-operate with the Department of Commerce or engage in any further activities. Despite the confidence they may have, based on their own opinions, as to their legality, it is contended that they will want assurance from the Government before proceeding further.

Favors Trade Associations

The Attorney General himself, in commenting on the decision, said he was unqualifiedly in favor of trade organizations which confined their operations to improving their services to the public, but he stated they would not be permitted to fix prices or apportion territory among themselves, resulting as it does, he asserted, in restricting competition. This plainly is a broad view and it is confidently believed, if left to itself, would mean that the decision would affect a decidedly small percentage of trade associations, as Mr. Hoover claims is the situation. But attorneys are insistent that the decision itself is much greater in its scope than the dealing with prices, apportioning of territory, etc., and think legislation will be necessary to insure the associations of their legality, a view that indicates a policy announced by the Department of Justice might even be insufficient.

The Attorney General proceeded to state that trade associations generally are showing a commendable willingness to confine their activities to the lines broadly suggested by the Department of Justice as in conformity with the law. Where the department's advice has been disregarded, however, it was pointed out, it has been necessary to proceed under the Sherman law. As a matter of fact, there are those who think the decision lacks in comprehensiveness and that consequently it will be necessary to try a number of other cases on their merits, although it is hoped that this will not be necessary and that it may be avoided either by the announcement of a definite governmental policy or through legislation.

It is no surprise, but it is interesting to note the remarks in the majority opinion where it makes a distinction between the exchange of information among sellers only and between sellers and buyers. The decision says:

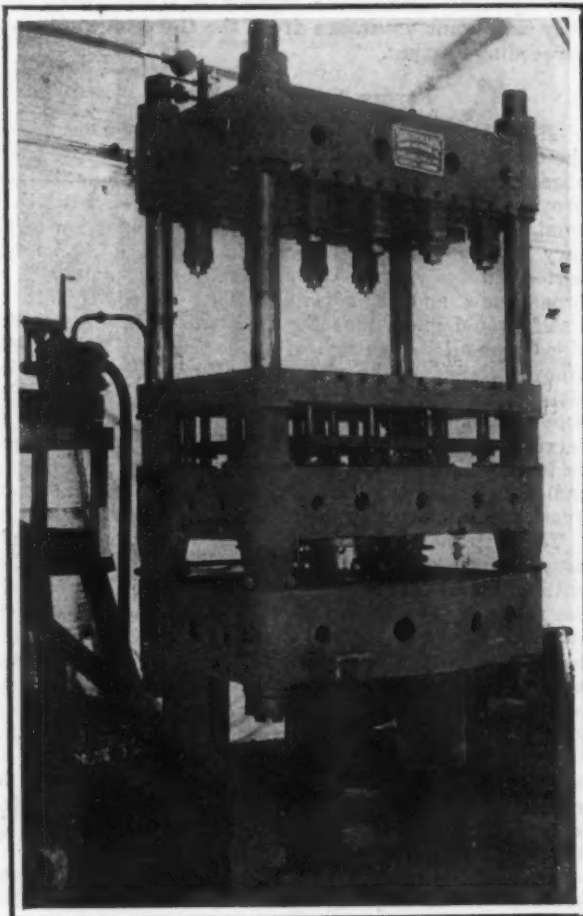
In the presence of this record it is futile to argue that the purpose of the "Plan" was simply to furnish those engaged in this industry, with widely scattered units, the equivalent of such information as is contained in the newspaper and Government publications with respect to the market for commodities sold on boards of trade or stock exchanges. One distinguishing and sufficient difference is that the published reports go to both the seller and buyer, but these reports go to the seller only; and another is that there is no skilled interpreter of the published reports, such as we have in this case, to insistently recommend harmony of action to prove profitable in proportion as it is unitedly pursued.

Obviously, as was to be expected, the decision does not affect publication of trade information in the lay and class press, nor does it have any bearing upon boards of trade and stock exchanges. Nevertheless the point has its value. This is particularly so because the Department of Justice in its proceedings in the so-called Southern Pine case, similar in many respects to the Hardwood case, made certain lumber publications defendants. The finding of the Supreme Court would indicate plainly that the Government's case as it applies to these publications will fall flat.

Hydraulic Automobile Body Press of 450 Tons Capacity

The Southwark Foundry & Machine Co., Philadelphia, has recently developed an all-steel automobile body press having a capacity of 450 tons. It is shown in the accompanying illustration.

With the intention of providing exceptionally sturdy construction the main ram is located in the lower base, to which are secured the four press columns. One clamping platen and one stripper platen are provided. The stripper platen is heavily made and carries four hydraulic cylinders, which act upon a forged steel plate which in turn carries 60 stripper pins $1\frac{1}{2}$ in. in diameter. These stripper pins project through the clamping platen. The clamping platen is a solid steel casting and is provided with Tee slots. The top platen



The Stripper Platen Carries Four Hydraulic Cylinders Which Act Upon a Forged Steel Plate.

carries eight hydraulic jacks which are used for clamping and which have 5-in. diameter rams with 5-in. stroke. The top platen itself is adjustable to meet conditions of the various size dies which may be employed under the press.

The control of the press is by a single lever operating valve which first admits low pressure to the four jack cylinders and at the same time admits low pressure to the main ram. As soon as the dies come together high pressure is admitted through the steam operating valve, thus completing the work on whatever shape is to be formed in the dies. The clamping cylinders are controlled automatically from a low-pressure filling tank and are capable of standing a hydraulic press of 5000 lb. per sq. in.

The press has a die space of 7 ft. x 5 ft. The minimum vertical opening between the platens is 18 in., and the maximum, 4 ft.

Executive offices of the Engineers' Society of Western Pennsylvania have been removed from the Union Arcade, Pittsburgh, to the William Penn Hotel, also in Pittsburgh.

Michigan Foundrymen's Association

KALAMAZOO, MICH., Dec. 27.—Foundries in Michigan are operating about 25 per cent capacity, and have enough pig iron on hand to run for close to three months without any additional purchases. That was disclosed at a meeting of the Michigan Foundrymen's Association, held at the Park-American Hotel, recently. The report on business conditions was prepared by A. W. Blodgett, secretary, and was based on 21 answers to questionnaires mailed to state plants. These answers showed that while the normal monthly melt of these 21 foundries is 9385 tons of pig, only 2337 tons were used in October and that the concerns have 6893 tons of pig in yard. October production compared with September showed an increase of 5 per cent.

The session in Kalamazoo was really the second of the organization's gatherings. Established only a few months ago, this association boasts 31 concerns enrolled to date. Six memberships were added the past month. Secretary Blodgett reports there are over 200 foundries in Michigan eligible for membership in the State association and that efforts are now being made to round them all up.

A large portion of Tuesday's meeting was devoted to the consideration of problems and troubles met by foundrymen. The question box promises to assume an important place on all programs. A discussion of trade conditions and the welfare of the association also occupied much time. Immediately following luncheon, John C. Hoekje, registrar of Western State Normal College, addressed the gathering.

The next session will be held in Battle Creek, Tuesday, Feb. 14. A. W. Blodgett, J. C. Jensen and H. J. Hartman, all of Grand Rapids, were empowered to arrange the program. Battle Creek has no members and it is believed the meeting there will induce many of that city to enroll.

Officers of the Michigan Foundrymen's Association are: President, J. Edgar Lee, Grand Haven; vice-president, W. O. Adams, Ann Arbor; secretary, A. W. Blodgett, Grand Rapids; treasurer, E. N. Turner, Manistee; directors, W. W. Sherman, Muskegon; A. K. Hanchett, Big Rapids; Henry J. Hartman, Grand Rapids; Charles Clarage, Kalamazoo; C. L. Pearce, Marquette.

Baltimore Tank Maker Expands

The Novelty Steam Boiler Works Co., Baltimore, is building another factory building, two stories, brick and steel, 110 x 155 ft., in the 900 block, South Howard Street. The concern specializes in the manufacture of steel tanks for the storage of air, water and oil. The company has 50 men working day and night and enough contracts to maintain full operation for a year or more. The company started in 1905. In August, 1920, it was reorganized, five former employees of a well-known manufacturing plant in Decatur, Ill., having secured the controlling interest. Each came from a different department and each is now head of a department in the Baltimore company to-day. Oscar S. Jennings is president; C. C. Lanman is vice-president and general manager; Raymond J. Kitchen is secretary.

Freyn, Brassert & Co., Chicago, have recently shipped boiler and hot blast stove burner equipment to the Rochester & Pittsburgh Coal & Iron Co., Punxsutawney, Pa., and the Chateaugay Ore & Iron Co., Standish, N. Y. The Shenango Furnace Co. has recently installed this company's Mathesius hot blast gate valve equipment. Freyn, Brassert & Co. have also been retained by the Mitchell-Diggins Iron Co., Cadillac, Mich., in reference to power plant matters.

Clinton E. Woods, receiver for the Bethlehem Motors Corporation, Allentown, Pa., manufacturer of automobile trucks, is developing plans for a sale of the property. It is said that an offer of \$400,000 has been made for the plant and equipment, with a creditors' committee asking not less than \$750,000 for the property.

Fuel Saving in Modern Gas Producers*

Avoiding Present Wastes of Fuel in the Industries Using Gas Producers, Producer-Gas Furnaces and Industrial Furnaces

BY W. B. CHAPMAN†

THERE are about 10,000 gas producers in the United States, divided approximately as follows: 6500 in the steel industries; 1500 in the glass industries; 500 in the chemical industries; and 1500 in miscellaneous industries. Under "miscellaneous" are included the ceramic industries, lime burning and about 200 gas producers used for power.

Engineers have given much attention to the engine room, some to the boiler room, a little to industrial furnaces, and least of all to the making of raw producer gas. Hence the backward condition of the gas house.

No definite data have been compiled by the Government on the amount of coal used in gas producers; but, with the assistance of such figures as are available, it is estimated roughly that in the steel industries about 15,000,000 tons of bituminous coal are transformed annually into raw producer gas for use, and in the glass industries about 2,000,000 tons.

In the steel industries about the same amount of coal is used for making gas to heat furnaces as for making steam. In glass making, three-fourths of all the fuel is used in gas producers. But wherever producer gas is used it is apt to be the most backward part of the business. A given amount of time and money, if spent on improving conditions in the gas house, will usually bring larger returns than in any other department. In most industries requiring large heating operations, more trouble arises in that department than in any other part of the business.

Savings with Mechanical Producers

With the usual more or less unskilled and indifferent handling, any of the four American mechanical producers can make a gas averaging 150 B.t.u. (low values), instead of the customary 125 B.t.u. obtained in hand-poked producers if operated with zeal. With skilled handling the best mechanical producers will average from 160 to 175 B.t.u., provided the coal is fair and the rate of gasification does not exceed 25 or 30 lb. per sq. ft. per hr., which is about twice the capacity of hand-operated producers.

A Duff producer, operating originally at 10 tons a day and making gas having 125 B.t.u., was fitted with a Chapman agitator and automatic feed, and at 36 tons a day gave an average of 163 B.t.u.

As there are more Duff producers in use in the United States than any other type of hand-poked producer, the test made by the engineers at one of the largest steel works will be of special interest. This producer was rebuilt to a diameter of 10 ft. 6 in. No hand-poking was done during the test, and no clinkers were made. A standard gas temperature of 62 deg. Fahr. was used. The West Virginia coal used had 37 per cent volatile matter. Data are given in Table I.

Similarly, a Von Kerpley producer, the most popular mechanical type in Europe, gasifying 20 lb. per sq. ft. per hr., making about 135 B.t.u. gas, was equipped with Chapman agitator and automatic feed and changed to 34 lb. gasified per sq. ft. per hr. and 178 B.t.u. This was maintained without difficulty, and without any hand poking. Data are given in Table II.

Like other European producers, the Von Kerpley producer has continuous ash removal and continuous agitation of the ash bed and lower part of the fire bed, and there is no agitation of the upper part of the fire bed and no automatic feed. Before installing the Chapman automatic feed and floating agitator, the capacity was 12 cwt. per hr., and in spite of an enormous

amount of hand poking the producer was usually full of clinkers. After the new equipment was added, the capacity was increased considerably over 50 per cent, no hand poking was required and no clinkers were made. The works engineer estimated that the saving in labor alone was sufficient to pay for the equipment in nine months. The B.t.u. content of the gas was increased about 30 per cent.

Properly operated, the best modern producers will usually save about 25 per cent of the coal and an equal amount of labor. These savings should amount to the total cost of the installation in from one to four years.

The temperature in a gas producer is highest at the bottom of the fire, and the thicker the fire, the cooler the top. The temperature at the bottom should be as high as the fuel will stand, without running too much risk of melting the ash. The melting point of the ash in all the good Pittsburgh gas coals is well above 2500 deg. Fahr.; and of the ash in Illinois coals, about 300 deg. lower. The temperature at the top of the firebed should be as low as will permit the gas to be conducted to the place of use without forming objectionable tar deposits, and also as low as possible without making the top too sticky and difficult to blow through.

Usually a "top temperature" of 1000 deg. Fahr. is about right, but, if the gas is to pass through a water-cooled reversing valve located some distance away, 1200 deg. would be better. A "hot top" destroys some of the richest gases and thus wastes fuel. More fuel is wasted in a producer, from running with a hot top, i.e., over 1300 deg., than from any other cause.

The Furnace Part of the Problem

But gasifying the fuel is only half the problem of conserving it. The other half lies in its utilization in the furnace. The two halves of the problem are inseparable. Space is too limited to take up more than one kind of furnace—the kind that holds the most promise for fuel conservation, and the kind that, until the last decade, has largely been a failure—the recuperative furnace.

A recuperative furnace is never "reversed" and, except in rare instances, only the air is preheated. It costs much less to build and to repair, is easier to operate and gives practically the same efficiency, as the expensive and cumbersome regenerative furnace.

Its field of application is very broad, and it can be used effectively in both large and small operations, for furnace temperatures as high as 2700 and as low as 1400 deg. Fahr. About the only uses to which it is not suited are for operations which periodically require a large overload, such as the open-hearth process and large forgings over 32 in. in diameter, also for large glass melting tanks. For almost all other purposes the recuperative furnace can be used with great economy.

In many operations, where the air is not now preheated, it will be found that from 20 to 40 per cent of the fuel can be saved by using a good recuperator—one that preheats the air to within 500 deg. Fahr. of the temperature of the furnace.

Table I—Test of Duff-Bradley Producer with New Blowers and Chapman Automatic Feed Floating Agitator

Analysis of Seven-Hour Continuous Sample of Gas						
Rate of gasification per 24 hr. = 37.36 tons.						
Rate of gasification per hr. per sq. ft. = 36 lb.						
Percentage Analysis of Gas Samples						
CO ₂	Cn H ₂ n	O ₂	CO	CH ₄	H ₂	N ₂
4	1.4	0.5	26.8	3.0	10.4	54.2
Calorific power of gas per min.						552,750 B.t.u.
Sensible heat of gas per min.						24,100 B.t.u.
Total useful heat of gas per min.						546,850 B.t.u.

*Abstract of paper presented before the American Society of Mechanical Engineers, Dec. 6.
†President Chapman Engineering Co., New York.

Average coal fed per hr., by weight.....	3,114 lb.
Average coal fed per hr., calculated from above analysis	3,081 lb.
Difference	33 lb.

External Heat Balance

Dr.	B.t.u.	Per Cent	Cr.	B.t.u.	Per Cent
B.t.u. per lb. coal	13,039.0	97.5	Calculated power of gas	10,660.0	79.7
B.t.u. steam and air.....	336.5	2.5	Sensible heat of gas.....	1,803.0	13.5
			Loss unburnt coal	146.5	1.1
			Other loss (radiation, etc.)	716.0	5.7
	13,375.5	100		13,375.5	100

Total losses, 6.3 per cent.
Efficiency of producer, 93.2 per cent.
Steam pressure, 52 lb. per sq. in.

Table II—Test of Von Kerpely Producer with Chapman Agitator and Automatic Feed

Test on 9 ft. 7 in. inside diameter Von Kerpely gas producer, fitted with a Chapman agitator with automatic feed.
Duration of test, 49½ hr.

Average percentage analysis of gas samples taken hourly:

CO ₂	C ₂ H ₄	O ₂	CO	H ₂	CH ₄	N ₂
4.74	0.30	0.30	24.6	12.80	5.26	52.00

Net English heat values used:

CO—345, H₂—290, CH₄—975, C₂H₄—1590

Heat Balance

Dr.	B.t.u.	Per Cent	Cr.	B.t.u.	Per Cent
B.t.u. per lb. coal	13,906.0	97.2	Calculated power of gas.....	11,498.9	80.34
Sensible heat of coal.....	13.2	0.09	Sensible heat power	1,925.0	13.50
Sensible heat of steam.....	328.8	2.3	Loss in unburnt coal..	46.3	0.32
Sensible heat of air.....	54.0	0.41	Sensible heat of ash.....	1.8	0.01
			Sensible heat of water passed through agitator	55.46	0.38
			Other losses (radiation, etc.)	774.54	5.45
	14,302	100		14,302	100

Total losses, 6.16 per cent.
Efficiency of producer, 93.84 per cent.
Producer equipped with Chapman 5-stage blower with 7/16 in. nozzle.
Coal used: Florence beans 17.62 per cent, Florence nuts 30.65 per cent, Stafford cobbles 20.73 per cent, Florence cobbles 31.00 per cent.
Average coal fed per hour, 2408 lb.
Coal gasified per sq. ft. per hr., 34.01 lb.
Total combustibles in gas produced, 42.90 per cent.
Steam used, 0.278 lb. per lb. of coal.
Gas per lb. of coal, 64.6 cu. ft.

Mining Experiment Station at Minneapolis

Work is now under way on the construction of a mine experiment station laboratory at the University of Minnesota at Minneapolis. It will house the north central experiment station of the United States Bureau of Mines. The superintendent of the station says it will be without exception the best laboratory in the world for the study of iron and manganese ores. The building, which is of factory type construction, is 60 x 280 ft. in plan, partly two stories and basement in height, partly five stories in height and the whole enclosing 1,000,000 cu. ft. The building and equipment will cost approximately \$300,000, not including \$20,000 additional for laboratory apparatus. Ground was broken Dec. 17 and the specifications call for completion on Sept. 1, 1922.

The Goodyear Tire & Rubber Co., 123 West Sixty-fourth Street, New York, with main plant at Akron, Ohio, has negotiations under way with the Brazilian Government for continuance of concessions previously granted on State property for the erection of a rubber manufacturing plant on the site. The project was planned, initially, some time ago but has been held in abeyance owing to conditions.

The Hoover Wagon Co., York, Pa., has arranged for a change of name to the Hoover Body Works, and in the future will concentrate operations on the manufacture of automobile bodies, with considerable expansion in production. A two-story factory on Webster Avenue, Long Island City, recently has been acquired, and will be equipped for a branch plant. It will provide about 18,000 ft. of floor space.

Results of Studies of Coal-Washing

Organic sulphur constitutes a larger proportion of the total sulphur in coal than is generally recognized, according to a report of the investigation of bituminous coal-washing practice in the Middle Western states by the United States Bureau of Mines, the mining department of the University of Illinois and the Illinois Geological Survey. Sulphur occurring in organic combination with the coal substance and finely disseminated pyritic sulphur can not be removed by washing. Of 110 face samples taken in four beds, two in Kentucky, one in Illinois and one in Alabama, in 53 samples the organic sulphur made up more than 50 per cent of the total sulphur.

In co-operation with the mining companies, the coal washeries at Issaquah, Grand Ridge, Ravensdale, and Wilkeson, in Washington, and at Beaver Hill, Ore., have been studied. All experimental work, except the supplementary laboratory tests, was done in the plants.

The principal results of the tests show: (1) The raw coal as it comes to the surface contains much bone, shale and clay, most of which must be removed before the coal is marketable; (2) the present washeries are inefficient, the washed coal containing avoidable impurities, and the refuse an excessive proportion of good coal. Proper adjustment of the washers not only improved the quality of the washed coal but also greatly reduced the loss of good coal in the refuse; (3) by re-arranging present flow sheets and replacing many old machines now in use with improved coal-washing equipment, the practice at each plant could be greatly improved.

Since the completion of these studies two coal companies have remodeled their plants and another company has started work on a new plant to replace its present one. Based largely on results of experiments by the Bureau of Mines, one mine is building a table-washing plant to treat a pile of refuse amounting to more than 1,000,000 tons, estimated to contain approximately 200,000 tons of recoverable coal of coking quality.

Two papers are being prepared for publication by the Bureau of Mines, one on the subject of "Specific gravity studies of Washington coals and their associated impurities," and the other on "Study of coal-washing problems in the Northwest."

Tests of the froth-flotation process, now widely used in concentrating various ores, showed that clean coal can be separated from ash in material passing a 20-mesh sieve, or finer. A great many coals, however, contain bone, or bony coal, in which the carbonaceous matter is so intimately mixed with ash that 200-mesh grinding does not separate them. As the bony coal is not as easily floated as the clean coal, re-treating the froth concentrate of coal yields clean coal, the bone forming a "middling." By the use of this method 95 to 98 per cent of the carbonaceous matter in the coal can be recovered in the concentrate and middling, and from 30 to 70 per cent of the ash discarded as tailing.

Puddling Rate Reduced to \$6

The Reading Iron Co., Reading, Pa., has reduced its rate for puddling from \$6.75 to \$6 per gross ton. Other tonnage rates are reduced in the same proportion and wages for workmen, aside from those paid on a tonnage basis, will be cut 10 per cent.

The Anderson Stove Co., recently organized at Anderson, Ind., will begin operations with the new year. It will make kitchen ranges for a Chicago mail order house. The directors of the company are John S. Keefe, Indianapolis; Jacob Keller, Belvidere, Ill., and Joseph McGinn, Louisville, Ky.

Harry W. Voss, head of the Evansville Association of Credit Men, Evansville, Ind., has been appointed receiver for the Hoosier Ice Machine Works, following a suit filed in the court by the Orr Iron Co.

Wesley Fleming, receiver for the Cornish Co., Washington, N. J., manufacturer of talking machines, etc., has been granted permission by the Court of Chancery to continue the operation of the plant.

PULVERIZED COAL-BURNING

Aero Pulverizer Breaks Up Coal and Blows It Into the Furnace

At the plant of the Brier Hill Steel Co., Youngstown, Ohio, a new equipment for burning powdered fuel has been installed experimentally which has some points of interest. The installation includes an aero pulverizer furnished by the Erie City Iron Works, Erie, Pa., which has a capacity of 3000 lb. of coal per hour. This unit, which is shown in two views, is being used to provide fuel for a continuous heating furnace supplied by Alex. Laughlin & Co. for heating slabs for the 84-in. plate mill. The furnace measures 9 ft. wide and 44 ft. 6½ in. long outside, including the combustion chamber.

The pulverizer consists of a cylindrical case resting upon a bed plate and with the rotating parts driven by a 40-hp., 900 r.p.m. motor. These rotating parts consist of paddles on the entering end and fan at the delivery end, both mounted on the same longitudinal shaft. Coal is re-



Pulverizer Assembled for Delivering Coal, Through Self-Contained Blower, to Distributing System

ceived at the end opposite from the fan in pieces of regular crusher size. The paddles break it up to such effect that it is pulverized when it reaches the fan. This permits the fan to lift it and blow it into the furnace, together with the proper amount of air for combustion.

Crushed coal is delivered into a hopper above the pulverizer by a conveyor belt with a magnetic head pulley, the latter removing stray particles of iron from the coal. The pulverized coal is discharged into a pipe 18 in. in diameter, which carries it about 20 ft. and then branches into two 10-in. pipes, which enter the furnace 2 ft. 5¼ in. each side of the center line.

When this piping was first installed, it was not possible to obtain an equal distribution of the fuel because of curves in the pipe. This was easily remedied, however, by placing a deflector plate at the point where the pipe branches. As slack coal has been used, with a certain moisture content, the question of artificial drying has not been settled. As the installation has been run only a portion of the time, because of slack business, its future is not definitely determined, but reports indicate that it has given good service so far as it has been used.

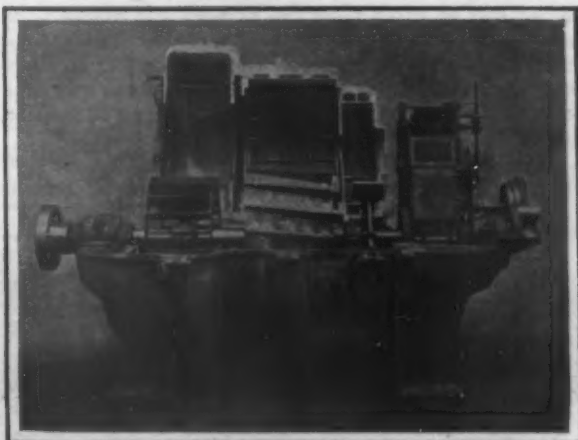
Foreign Trade Council to Meet in Philadelphia

The ninth annual convention of the National Foreign Trade Council will be held in Philadelphia on May 10, 11 and 12, 1922. Previous meetings have been held in St. Louis, New Orleans, Pittsburgh, Cincinnati, Chicago, San Francisco, and Cleveland.

Referring to the impression in some quarters that the foreign trade of the United States has all but disappeared, Secretary O. K. Davis of the Foreign Trade Council says: "I wonder how many people in this country realize that our exports for the last six months

have been 63 per cent greater in value than in 1913, and about 15 per cent greater in volume; and that in the six months ending September, 1921, we have exported commodities valued at \$2,025,236,000 and have imported goods valued at \$1,197,850,000.

"The truth of the matter is, that the productive capacity of the United States has been so greatly increased during the war that our former 'normal' exports are not nearly great enough to enable our factories and farms to operate profitably at full capacity. It is certain that our foreign trade, considerable as it is even at present, must be expanded if the United States is to enjoy real domestic prosperity. The National Foreign Trade Council believes that our foreign trade can and will be so expanded, even in the face of



Cover Lifted to Show Paddles and Fan Blower, by Which Coal Is Handled

present difficulties, provided all elements of American industry, agriculture and finance will co-operate to that end."

Will Not Build Warehouse

Reports that the Jones & Laughlin Steel Co., Pittsburgh, would build a large warehouse at Evansville, Ind., to be used in distributing steel products unloaded from barges being sent down the Ohio river by the company, are untrue, as the company has no such project in mind. However, the Jones & Laughlin Steel Co. has suggested to the proper authorities in the different communities at which its steel products are unloaded from the barges sent from the Pittsburgh and Allequippa mills, that these different communities should provide proper unloading facilities. In any event, these would not consist of more than unloading equipment and possibly a covered platform from which delivery could be made to customers in these communities by truck or wagon.

Buy a Ton of Iron!

It would be lovely this Christmas season if someone could start an effective movement with the slogan "Buy a Ton of Iron," says the current trade bulletin of the Matthew Addy Co. "That worked all right in cotton. And there were hundreds who bought a bale of cotton and made a good thing out of it. Now if the general public would take notice of the low prices prevailing for iron and of the hard conditions that the furnaces face and would start buying iron in a kindly benevolent but speculative way, it would help. The only thing the iron market needs is more liberal buying. It is the small volume of trade that worries the iron master."

John A. Ortel, safety engineer Carnegie Steel Corporation, Pittsburgh, last week talked on Educating the Workman, at the Y. M. C. U., Boston, under the auspices of the Massachusetts Safety Council.

Leroy S. Starrett, president L. S. Starrett Co., Athol, Mass., machinists' tools, has organized the Metropolitan Air Goods Co., capitalized for \$200,000, to manufacture pneumatic and waterproof goods.

Special Crane for Ordnance Plant

A 75-ton electric traveling crane having features to meet unusual conditions including a runway 165 ft. above the ground, which is believed to be the highest lift ever provided in a crane of this type, has been completed by the Cleveland Crane & Engineering Co., Wickliffe, Ohio, for the government naval ordnance plant at Charleston, W. Va. It will be installed in the heat-treating department for handling large naval guns during the heat treating operations.

An unusually high lift is required as it is necessary to handle, in a vertical position, naval guns that, with their test piece, are 87 ft. long. A gun will be brought into the plant on a railroad car, placed in a vertical position in a heat-treating furnace, and, after being heated will be lifted from the furnace and placed vertically in a tempering tank 108 ft. deep. These tanks extend into a pit 54 ft. below the floor and 48 ft. above the floor. Consequently the upper end of the gun must be raised over 135 ft. to permit the lower end to clear the top of the tank.

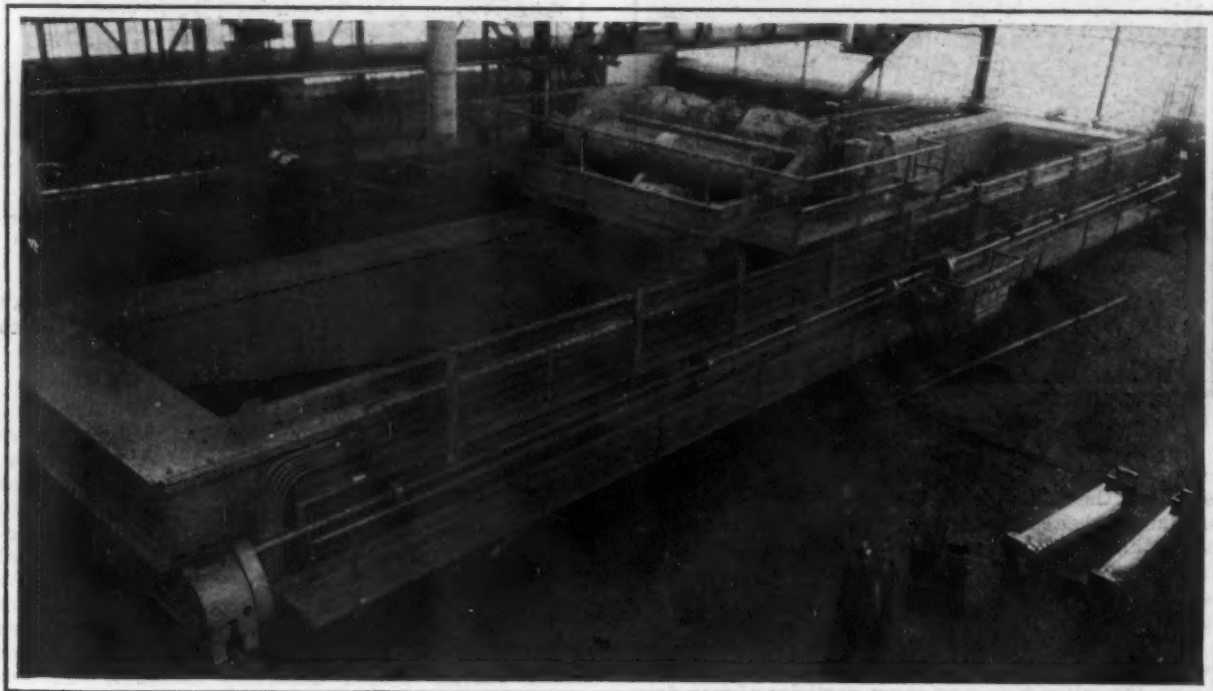
The crane runway being the height of a 15-story office structure required a building of unusually massive

and two 50 hp. motors for the bridge travel, there being one motor on each bridge girder. The hoist has a brake on each motor and on the second reduction shaft, making four brakes on the hoist. Because of the high lift, the hoist required 2600 ft. of 1½-in. rope.

Purchase of Ashland Iron & Mining Co. Ratified

Shareholders of the Ashland Iron & Mining Co., Ashland, Ky., at a meeting on Dec. 21, ratified the negotiations for the purchase of the property by the American Rolling Mill Co., and the assets of the Ashland company now become those of the Rolling Mill company. Besides the steel plant, consisting of two blast furnaces, six open-hearth furnaces, a modern electrically driven blooming mill, slab, billet, bar and sheet mills, the deal also includes the Ashland Coal, Iron & Railway Co., operating 48 miles of track, and the Interterminal Transit Co., which handles a large part of the industrial switching of Ashland. Some 22,000 acres of coal and timber are also included.

The purchase of the Ashland properties gives the American Rolling Mill Co. combined assets valued at



Crane for Handling Large Naval Guns in Heat-Treating Department of Naval Ordnance Plant, South Charleston, W. Va. The capacity is 75 tons, span 114 ft., and runway 165 ft. above the ground

construction to carry the load. A locomotive crane with a 250-ft. boom was used in handling steel during the erection. In addition to the high lift the predominating features of the crane include an unusually long span for its capacity, the span being 104 ft., and the high speed of the lift. The hoist speed is 50 ft. per min. and the lowering speed 100 ft. per min. both with a full load. These speeds enable quick handling of a gun from the furnace to the quenching tank. Another interesting feature is that when lowering at full speed with a full load the braking equipment that is provided, will stop the load within one foot. The crane has an automatic limit switch that stops the load 110 ft. below the crane rail. If the gun is to be lowered further, its lowering movement is continued by the operation of a push button.

The trolley travel and bridge travel are each 50 ft. per min. Rapid bridge travel is not required as the crane runway is comparatively short, being only of sufficient length to cover the furnaces and tempering tanks. The crane is operated from a pulpit, and magnetic control is provided throughout. Five motors aggregating 550 hp. are used in its operation. It has a double bridge drive. There are two 200 hp. motors on the main hoist, a 50 hp. motor for the trolley travel

\$55,000,000, according to a statement of President George M. Verity. The plans of the American Rolling Mill Co. at present are to continue operations at the same scale now in effect.

The Rolling Mill company has paid the equivalent of \$1,000,000 for \$6,000,000 net assets of the Ashland corporation. The Rolling Mill company also assumes the bonded indebtedness of the Ashland company, amounting to \$4,000,000. In the deal the Ashland stockholders received 39,875 shares of the common stock of the American Rolling Mill Co. for their properties. This stock is to be held in the corporate treasury until Oct. 1, 1923. Each shareholder of the Ashland company is entitled to one share of Rolling Mill common, par value \$25, for every 2½ shares of common stock of the Ashland company, the par value of which is \$50 per share.

The Kelley Island Lime & Transport Co., Cleveland, will absorb the Dolomite Products Co., Narlo, Ohio, the merger becoming effective Jan. 1. Howard P. Eels, president of the Dolomite Co., will become vice-president of the merged organization.

SERIOUS STRIKE TROUBLES

Governor of Kentucky Orders Troops to Maintain Order at Newport

The strike now in progress at the plants of the Andrews Steel Co. and the Newport Rolling Mill Co., at Newport, Ky., has been marked with much shooting during the past ten days. About two hundred men are at present employed in the plant, and many of the men on their way to work have been waylaid and beaten, and at times revolver shots have been fired at automobiles carrying employees. The union officials disclaim all knowledge of these shootings. On a night recently it is estimated that about 200 shots were fired in the vicinity of the mills, and many houses were hit. An injunction restraining union members and sympathizers from interfering with the employees of the company engaged in the interstate commerce has been handed down by U. S. Judge Cochran, but mill officials claim that it is only observed in the breach.

Governor Morrow, of Kentucky, has ordered four companies of the Kentucky National Guard, numbering 160 men, to Newport. This action was taken following a request of the mill officials for protection to their workmen while going to and from the mill. The civic officials of Newport and Campbell County, refused to sign a requisition for troops to maintain order, stating that they were capable of handling the situation. The Governor's action came after an investigation conducted by two State officials who had been sent to inquire into conditions prevailing at Newport.

In the Field of Labor

The New York, New Haven & Hartford Railroad has practically closed its repair shops at Readville, Mass., and at East Hartford, New Haven and Norwich, Conn., for an indefinite period. The layoff at the Readville shops involves 1000 men, at New Haven as many, at East Hartford 400, and at Norwich in the neighborhood of 100. The action of the New York, New Haven & Hartford Railroad management followed the laying off of 400 employees at the Boston & Albany Railroad's West Springfield, Mass., locomotive repair shops for two weeks beginning Dec. 22. The car repair shops at West Springfield continue in operation.

The Boston & Maine Railroad has posted notices of a substantial wage reduction applying to all classes of railroad employees over the entire system. No date has been set for the wage reduction to go into effect, but the management proposes to confer with the men beginning Jan. 15. For shopmen, including machinists, boiler-makers, blacksmiths, etc., the proposed scale will be 52c. to 67c. per hour according to classification of the workman, as contrasted with 72c. to 82c., the present range of wages. Such a wage reduction will bring the pay of machinists and such classes of workmen down to the scale existing prior to May 1, 1920.

The Quincy, Mass., branch, an assembling plant, of the Waltham Watch Co., Waltham, Mass., has resumed operations after having been closed since July last.

The Hartford Machine Screw Co., Hartford, Conn., has reduced wages 10 per cent.

The plant of the Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., employing about 950, closed Saturday, Dec. 24, for inventory purposes. It will reopen Jan. 7.

The Laconia Car Co., Laconia, N. H., which has \$1,500,000 car repair work for the Boston & Maine and the Central railroads on its books, is employing 350 men, but anticipates increasing this number after the turn of the year when the plant will be operated at capacity.

F. H. Payne, president Greenfield Tap & Die Corporation, Greenfield, Mass., in behalf of the company, last week presented annual Christmas checks to members of the Old and Junior Guards, employees, who have served the company more than ten and five years, respectively.

Refractories Prices Still Weak

PITTSBURGH, Dec. 26.—Refractories prices still are slipping because of the keen competition for orders generated by the fact that there is not enough business to give all a share. On high duty Pennsylvania and Ohio fire clay brick, the common basis of sales now is \$30 per 1000, f.o.b. works, though public quotations still range \$2 to \$5 above that figure. Kentucky makers of this grade of brick are holding rather well to \$32, but it is admitted that some shading would be developed by the appearance of a sizable inquiry. Missouri makers are reported to be seeking business in nearby districts, giving basis to a suspicion that they are not holding firmly to quotations in view of the much higher freights than those from Pennsylvania and Ohio plants.

We are revising down our prices of fire clay brick in all districts save Kentucky. At least four makers of Pennsylvania silica brick are taking business at \$27, and in the Chicago district no business to speak of now is being done at above \$35. There is little firmness in magnesite or chrome brick. Demand for all grades is purely hand-to-mouth and shipping instructions usually accompany every order. Stocks in consumers' hands are reported to include only a few standard sizes, for which there is daily use, but there are some pretty big stocks of special sizes.

We quote per 1000 f.o.b. works:

Fire Clay	High Duty	Moderate Duty
Pennsylvania	\$30.00 to \$35.00	\$28.00 to \$30.00
Ohio	30.00 to 35.00	28.00 to 30.00
Kentucky	32.00 to 35.00	30.00 to 32.00
Illinois	32.00 to 35.00	30.00 to 32.00
Missouri	32.00 to 35.00	28.00 to 32.00
Silica Brick:		
Pennsylvania		28.00
Chicago		35.00
Birmingham		40.00
Magnesite Brick:		
Standard size, per net ton.....		52.00 to 55.00
Chrome Brick:		
Standard size, per net ton.....		46.00 to 48.00

Officials of Falcon Tin Plate Co.

The Falcon Tin Plate Co., which has been organized to operate the plant of the Carnahan Tin Plate & Sheet Co., Canton, Ohio, following the purchase of the latter plant by Paul Wick and Lloyd Booth of Youngstown, who control the Falcon Steel Co. in Niles, has elected Lloyd Booth president and treasurer and Paul Wick vice president and secretary. The board of directors consist of these officers and W. A. Thomas, formerly president of the Brier Hill Steel Co., C. H. Booth, formerly associated with the United Engineering & Foundry Co., Youngstown, and J. E. Carnahan, Canton, formerly principal owner of the Carnahan company. The Falcon Tin Plate Co., through a Cleveland investment house is offering \$750,000 in first mortgage 8 per cent sinking fund gold bonds.

May Buy Steel Common at \$84

In accordance with the stock subscription plan heretofore adopted by the finance committee, the employees of the United States Steel Corporation and its subsidiaries have been given the privilege of subscribing, during the month of January, for 100,000 shares of common stock at \$84 per share. In January of this year the stock was offered at \$81 per share and in 1920 at \$106.

The Butler-Edwards Electric Co., Easton, Pa., has arranged for a change in company name to the Butler Automotive Steel Co., to provide for expansion in manufacture in the line of automobile products, to include shafts, axles, gears, propellers and automotive electrical devices. Parke H. Davis has been elected president to succeed William H. McCammon. W. E. Butler is vice-president and treasurer.

The Universal Machine Co., Boston, has incorporated under Massachusetts laws to manufacture and deal in machinery for cooling and conditioning textile fabrics, paper, etc. Manufacturing will be done on the other side of the water. Ivar L. Sjostrom, North Andover, Mass., is president and treasurer.

Further Gains in Iron and Steel Exports

Larger Outward Movement of Steel Sheets and Rails—Year's Figures to Date Are Less Than Half of 1920—Imports Fall Off

WASHINGTON, Dec. 27.—Further improvement was made in iron and steel exports in November, the total for 28 items being 122,290 tons, valued at \$28,543,142. This was a gain of 15,708 tons over October, with a movement of 106,582 tons, valued at \$29,706,437. For the 11-month period ending with November of this

month period of 1920. Imports for November, 1920, amounted to 74,477 tons, valued at \$1,080,429. It will be noted that the average import value per ton was \$5.76 in November, 1921, and \$14.51 in November, 1920.

Machinery exports for November showed a decline when compared with October, the respective totals being \$14,436,849 and \$16,814,995. For the 11 months ending with November, 1921, the total exports of machinery were valued at \$275,346,019, as compared with \$593,612,060 for the same period of last year. Exports for November of last year were valued at \$41,659,329.

The gain in exports of iron and steel is reflected in the comparatively large shipments of steel sheets. The outgoing movement of this product in November totaled 36,954 tons, compared with 20,930 tons exported in October. For the 11-month period the total exports of sheets were 159,069 tons.

	November		Eleven Months	
	1920	1921	1920	1921
Ferromanganese	7,091	270	53,830	8,818
Ferrosilicon	710	1,456	13,592	6,698
Pig iron	35,313	2,193	153,381	23,126
Scrap	5,642	2,777	136,513	39,550
Bar iron	112	80	4,682	1,676
Structural steel	225	53	1,479	657
Billets, without alloys....	447	1,034	19,165	4,559
All other billets.....	264	51	4,252	1,261
Steel rails	309	2,406	44,061	21,154
Sheets and plates.....	203	38	1,697	1,942
Tin and terne plates.....	22	54	344	393
Wire rods	654	198	5,246	775
Total	50,992	10,610	438,242	110,609
Manganese ore and oxide..	74,477	8,620	542,189	386,454

year exports aggregated 2,075,674 tons, valued at \$577,924,704. This is less than half the 4,402,056 tons, valued at \$1,170,722,938, exported during the same period of 1920.

Imports of 12 items for November showed a decline, amounting to 10,610 tons, valued at \$2,041,772, as compared with October imports of 13,565 tons, valued at \$2,388,987. For the 11-month period ending with November of the current year, imports totaled only 110,609

	November		Eleven Months	
	1920	1921	Ending November,	1921
Ferromanganese	760	26	2,903	640
Ferrosilicon	2	..	603	318
Pig iron	13,167	1,273	203,267	24,797
Scrap	15,809	2,384	206,395	32,878
Bar iron	4,584	198	58,770	12,207
Wire rods	6,141	2,310	104,998	15,615
Steel bars	56,872	6,036	523,953	173,681
Billets, ingots, blooms....	7,042	1,869	213,458	10,113
Bolts and nuts.....	3,349	883	34,606	23,106
Hoops and bands.....	5,318	1,174	49,034	18,640
Horseshoes	58	69	1,793	578
Cut nails	699	124	3,268	1,035
Wire nails	10,023	121	81,041	21,137
All other nails, includ-				
ing tacks	1,580	314	10,982	4,376
Cast pipe and fittings....	6,819	2,152	55,898	46,998
Welded pipe and fittings	25,317	11,911	245,133	332,375
Radiators and cast				
house boilers	594	205	6,827	3,275
Railroad spikes	1,776	366	15,190	7,792
Steel rails	67,708	15,026	541,648	307,164
Galvanized sheets and				
plates	8,137	8,426	97,120	52,055
All other sheets and				
plates	2,557	821	27,297	11,994
Steel plates	79,424	8,835	806,404	327,496
Steel sheets	16,064	36,954	151,513	159,069
Ship plates, punched				
and shaped	5,480	283	40,696	9,532
Structural steel	42,839	11,005	430,159	287,600
Tin and terne plates..	15,424	8,381	205,456	98,557
Barb wire	15,508	2,939	115,779	29,099
All other wire.....	21,246	8,178	167,865	63,547
Total	434,297	122,290	4,402,056	2,075,674

	Gross Tons		
	All Iron and Steel	Pig Iron	Semi-finished Material
Calendar year 1919..	4,239,837	309,682	258,907
January, 1920	333,601	18,468	19,937
February	308,185	15,739	22,693
March	417,216	22,740	30,444
April	395,120	14,608	19,032
May	420,359	13,032	16,370
June	402,707	17,075	29,811
Fiscal year 1920....	4,212,732	248,126	288,766
July	458,866	29,647	17,243
August	431,484	22,645	20,920
September	409,200	22,724	18,113
October	452,015	17,296	11,853
November	434,297	13,929	7,042
December	498,765	10,055	3,415
Calendar year 1920..	4,961,851	217,958	216,873
January, 1921	547,394	3,710	315
February	393,328	1,307	92
March	230,635	2,320	1,023
April	162,592	1,234	678
May	142,551	2,541	749
June	119,081	1,689	1,106
Fiscal year 1921....	4,168,619	129,541	82,549
July	86,523	2,744	363
August	75,827	2,424	2,447
September	95,169	3,078	1,318
October	106,582	2,830	153
November	122,290	1,299	1,869
Eleven months	2,075,674	25,755	10,113

tons, valued at \$26,787,570. This compares with imports amounting to 438,242 tons, valued at \$47,185,447, which came in during the same period of 1920.

Manganese ore imports for November were 8,620 tons, valued at \$49,681, as compared with 36,760 tons, valued at \$214,748, imported in October. For the 11 months of the present year imports of manganese ore totaled 386,454 tons, valued at \$3,289,962, as compared with 542,189 tons, valued at \$11,071,228, for the 11-

It is interesting to observe that of the exports of sheets during the 11-month period, approximately 64 per cent, or 97,710 tons, went to Japan. Of November sheet shipments, those to Japan represented a little more than 80 per cent of the total, 31,565 tons going to that country. Among other exports of sheets for the 11-month period and for November, respectively, were Canada, 31,516 and 2,196 tons; Argentina, 4,072 and 689 tons; and the Philippine Islands 2,742 and 504 tons.

Steel rail shipments for November totaled 15,026 tons, and for the 11-month period, 307,164 tons. Japan also was the largest single purchaser of this product for both the 11-month and the single-month periods, taking 32,589 tons for the 11 months, and 4,777 tons in November. Shipments of rails to other countries included: Canada, 20,790 and 2,502 tons; Honduras, 11,914 and 1,144 tons; Argentina 11,182 and 1,549 tons, and Philippine Islands 6,630 and 1,034 tons. Japan also was the chief market for welded pipe exports in November, taking 3,549 tons of the 11,911 ex-

ported. For the 11-month period exports of welded pipe amounted to 332,375 tons, of which Japan took 24,553 tons. Other shipments of this product in November and during the 11-month period were as follows: Argentina, 1,927, and 11,817 tons; Mexico 1,868 and 110,979 tons; Peru, 799 and 16,069 tons; Cuba, 603, and 9,295 tons; and British India, 571 and 32,588 tons.

Exports of cast iron pipe in November amounted to 2,152 tons and for the 11-month period 46,998 tons. Canada took 874 tons in November, and 4,179 tons during the 11 months; Mexico, 271 and 16,289 tons; and Cuba 231 and 7,974 tons.

Japan was also the chief exporting market in November and for the 11-month period for tin plate. Of the 8,381 tons exported in November, Japan took 5,695 tons, and of the exports of 98,557 tons for the 11 months, Japan took 24,102, or 24½ per cent.

Exports of steel plates in November amounted to 8,835 tons and during the 11 months, 327,486 tons. Canada took 698 tons in November and 100,441 tons during the 11 months, while the United Kingdom took 668 and 54,511 tons, respectively. Of the structural steel exports of 11,005 tons in November, and 287,600 tons during the 11 months, Canada took 4,911 and 55,949 tons, respectively.

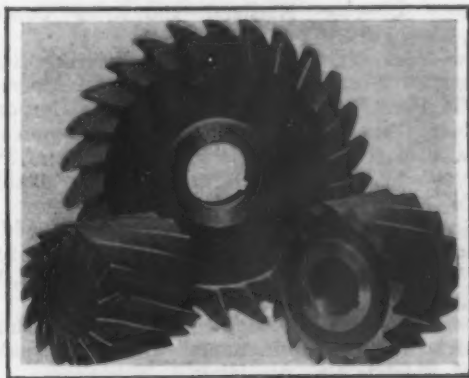
The largest single item of steel imports in November related to rails, the inbound movement of this product being 2,406 tons. Scrap ranked next with 2,777 tons and pig iron third, with 2,193 tons.

Exports of metal working machinery in November amounted to \$672,810, and for the 11 months \$18,862,988. Exports of lathes for these respective periods totaled \$67,911 and \$2,857,688; of machine tools, \$270,923 and \$4,554,586.

Develops New Milling Cutter

It is announced as the result of several years of research work, covering every phase of design and operation, the National Twist Drill & Tool Co., Detroit, has placed on the market a new type of milling cutter, known as the "parabolic" cutter.

A group of the cutters is shown in the accompanying illustration. The name "parabolic" is intended to characterize the distinctive construction of the teeth.



The Shape of Tooth Is that of a Parabola, Slightly Modified at One End

It was found that in order to make a milling cutter tooth of uniform strength throughout its length, its shape would be that of a parabola slightly modified at the small end. This shape was then adopted. The number of teeth used is nearer to that of the conventional fine tooth cutter than to that of the coarse tooth type. In order to get the most efficient chip thickness per tooth without excessive peripheral speed a fairly large number of teeth was found desirable.

Plain-side and end-mill types are made, and also cutters for special purposes.

The entire sales force of the National Cast Iron Pipe Co. will convene at a banquet at the Tutwiler Hotel, Birmingham, Ala., on Jan. 5. The salesmen will be the guests of the management of the company for the entire week.

OLD RATES RESTORED

Tariffs Extending Temporary Schedule on Iron Ore Suspended

WASHINGTON, Dec. 27.—Railroad tariffs which had been filed with the Interstate Commerce Commission on statutory or 30 days' notice extending beyond Jan. 1 the operation of reduced rates on iron ore from Lake Erie ports to interior blast furnaces have been suspended by action of the commission. These tariffs were three in number, two of them having been filed by the Erie Railroad and one by the Pennsylvania Railroad and applied to rates from Cleveland, Lorain and Toledo, Ohio. They had been filed to become effective to-day, and were to remain in force until April 26.

This procedure of the commission means that all rates on iron ore from Lake Erie ports beginning with Jan. 1 will return to the old and higher level prevailing prior to Oct. 18. It was taken to establish uniformity in the rates by supplementing the recent action of the commission in declining to grant to other railroads the right to extend the lower rates to April 30 on short notice and under a sixth section application. Interior blast furnace interests, which, with the railroads, urged the granting of this application based their plea partly on the ground that unless this was done the rate situation as it applies to iron ore would be chaotic after Jan. 1 because the three suspended tariffs having been filed upon due notice would become effective to-day. The action of the commission overcomes this situation.

The reduced rates on imported iron ore, however, continue in effect and this has been the cause of complaint also. These rates cannot be suspended except by voluntary action of the railroads which have them in effect or through formal complaint.

The re-establishing of the old rates on ore from Lake Erie ports is the result of complaint by the lake front interests which maintained that by reason of the fact they did not benefit by the reduction, they were being discriminated against because they had received no benefit through lower coal, coke and limestone rates. Failure to obtain this relief, they pointed out, also upset the relationship between rates on raw materials used in the manufacture of pig iron. Interior blast furnace interests maintained that there is no relationship in rates between these commodities.

In any event the restoration of old ore rates is accepted by some of those in the iron and steel trade as an opportunity to seek a general rather than a piecemeal reduction in all commodities which they consume and manufacture. Preparations toward this end have been made and representatives of the trade will present their case before the commission at the general rate investigation, hearings on which will be resumed Jan. 9.

Jones & Laughlin Did Not Buy Chicago Tract

The 15 acres of lake shore property just east of and adjacent to the Illinois-Indiana State line purchased last April from Frederick and Ernest Eggers for \$322,500, and generally supposed to have been bought by the Jones & Laughlin Steel Co., Pittsburgh, was actually acquired by the Commonwealth Edison Co., Chicago, as disclosed by a recent announcement by Samuel Insull, president. The land includes three acres skirting Lake Michigan for 2700 ft. and will be improved with one of the largest power plants in the world to supply current to the steel mill district. No definite date has been set for the construction of the plant, however.

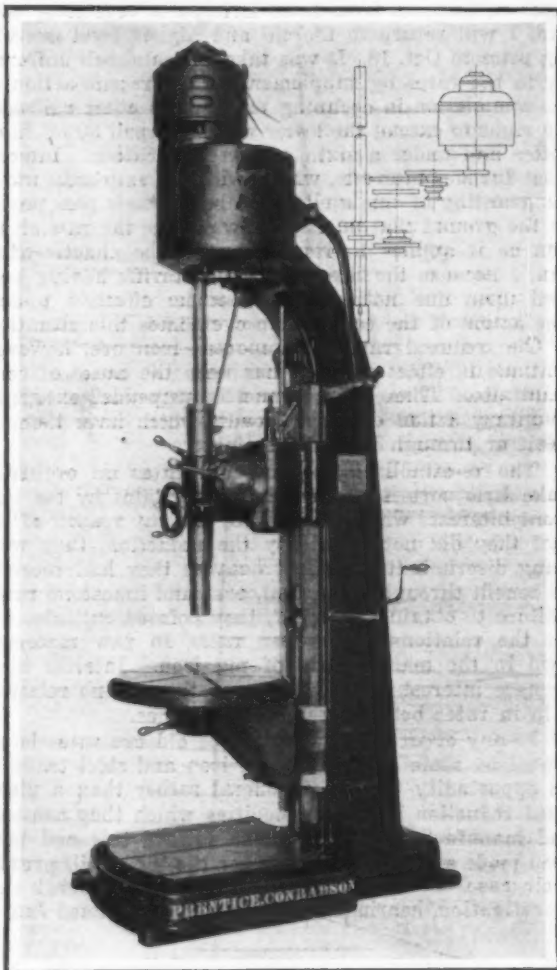
Rates Not Unjust

WASHINGTON, Dec. 27.—A tentative report prepared by Examiner Frank R. Mullen recommends that the Interstate Commerce Commission dismiss the complaint of the National Rolling Mill Co., vs. the Baltimore & Ohio, et al., against the rates on bar iron from Vincennes, Ind., to destinations in Indiana, Illinois, Missouri, Wisconsin, and Iowa, applied to shipments made between Dec. 5 and Aug. 25, 1920. The examiner states that the rates were neither unjust nor unreasonable.

Vertical Drill with Direct Motor Drive

A 32-in. vertical drilling machine, the chief feature of which lies in the direct application of the motor drive as shown in the illustrations, has been brought out by Prentice Conradson, Green Bay, Wis. Cone pulleys, belts, vertical shafts and other usual components have been eliminated. In this arrangement, it is claimed, tests show that no measurable loss takes place in the gearing and that smaller motors can be used, working at a higher power factor. The advantages resulting are said to include economy as to the cost of motor and in operating efficiency, as well as the saving in cost of the machine made possible by the elimination of many parts necessary in other designs.

The armature of the motor is built on a sleeve which



The Armature of the Motor Is Built on a Sleeve Supported in Ball Bearings Top and Bottom. The diagrammatic view shows the arrangement of the gearing.

is supported in ball bearings top and bottom. Mounted on this sleeve there is a pinion which engages with a gear mounted on the first intermediate shaft, as shown in the diagrammatic view. Sliding on splines on the intermediate shaft there is a cluster gear engaging with gears on the second intermediate shaft, the engagement of these gears being effected by means of a lever.

The cluster gear on the second intermediate shaft engages with gears keyed to the spindle driving sleeve, which drives the spindle through a key. The intermediate shafts and the spindle sleeve are mounted on ball bearings and oiled continuously by an oil bath. All gears on the shafts are of alloy steel, heat-treated.

There are nine speed changes, controlled by conveniently located levers. Six feeds are provided, ranging from 0.006 to 0.035. The thrust due to drilling is taken on a ball bearing. Rapid hand traverse is provided, also the usual hand feed, stop motion and depth gage. For tapping, the motor is reversed, acting as rapidly as if fitted with reversing clutches.

The motor shown in the illustration is the Watson,

built especially for the drill by the Mechanical Appliance Co., Milwaukee. The controller is also built especially for the drill, being developed by the Allen-Bradley Co., Milwaukee. The controller is designed to give snappy start and reverse and at the same time to protect the motor against accidental overloads. The controller is automatic in that the small master drum operates a clapper switch through a magnet, and at the same time the inverse time-element protective device prevents abuse without stopping the motor when called on for a short overload. No voltage protection is included.

Either alternating current or direct current motors are provided, attached to the machine. A 3-hp. motor at 1200 r.p.m. is recommended for ordinary work and a 5-hp. motor at 1800 r.p.m. for very rapid work.

The frame of the machine is cast integral with the headstock, the column and base being one casting. The table has the usual adjustments, and rectangular and sliding tables can be provided. The distance from the floor to the top of the machine is 10 ft. 2 in., and to top of spindle, 11 ft. 8 in. The capacity is 3 in. high-speed drill in steel and 4 in. pipe tap in cast iron. The weight is 3700 lb. net and the floor space occupied 30x54 in.

The drill will be made also in 25-in. and 36-in. sizes.

January Meetings of Mechanical Engineers

Among meetings scheduled by branches of the American Society of Mechanical Engineers for the immediate future may be mentioned the following:

New Britain, Conn., Jan. 3, address on the development and use of precision gages by Major W. E. Hoke, consulting engineer, Baltimore.

Worcester, Mass., Jan. 3, at Higgins Hall, Boys Trade School address on "Mechanical Heating Problems Solved Electrically" by C. L. Ipsen, General Electric Co.

Buffalo, Jan. 4, "Patents and the Patent Law" by A. M. Halcombe, Emery, Booth, Janney & Varney, Washington.

Norfolk Va., Jan. 6, at the Chamber of Commerce, addresses on "Engineers as Industrial Managers."

New Haven, Conn., Jan. 16, "Labor and the Present Industrial Situation" by Dr. Magnus W. Alexander, managing director National Industrial Conference Board, New York.

New York, Jan. 17, at the Engineering Societies Building, 29 West Thirty-ninth Street, "A Modern Automobile Plant," by P. L. Battey, Willys Corporation.

Toledo, Ohio, Jan. 19, at the Toledo Commerce Club, "Influence of the Automobile on the Design of Presses and Dies" by Neal W. Dorman, Toledo Machine & Tool Co.

Chicago, Jan. 20, at the Hotel Sherman, addresses by Prof. Dexter S. Kimball, Cornell University, and Dr. S. W. Stratton director Bureau of Standards, Washington, following a dinner meeting.

New York, Jan. 24, Engineering Societies Building, "Industrial Power Requirements" with D. B. Rushmore, General Electric Co., presiding.

Worcester, Mass., Jan. 24, in recreation room of the North Works of the American Steel & Wire Co., illustrated talk on "Manufacture and Use of Die Castings" by A. M. Brewster, president Atlas Die Casting Co., and "A Close-up of Stoker Combustion" by F. Harold Daniels, Sanford Riley Stoker Co., employing motion pictures.

Extensions at LaBelle Works

The Wheeling Steel Corporation, Wheeling, W. Va., contemplates making some large extensions to present equipment at its LaBelle Iron Works plant at Steubenville, Ohio. The company has inquiries out for a 35-in. two-high reversing blooming mill, together with tables, three heavy shears, transfers and other accessory equipment to be installed at LaBelle Works. It is expected that this contract will be placed very early in the new year, and possibly some other large equipment will be added to the LaBelle plant.

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The Normal in Pig Iron

If there were such a thing as a normal need or a normal output, as of pig iron, it would be proper to refer to current production as a percentage of this normal. Then industry might take comfort in the arithmetical argument that business must soon be better, when the percentage is low, or it might note the signal, though it rarely does, that business cannot long remain active when the percentage is much over 100. However, the nearest approach to such a mode of measurement is to express operations in percentage of capacity. Coming close to 100 is naturally regarded as satisfactory, while a very low rate has only one element of satisfaction—the belief that wear and tear requirements take roundly 50 per cent of capacity and cannot long be ignored. One fault there seems to be, that buyers do ignore necessity, as they have been doing this year's or it may be that the tradition as to the minimum consumptive rate at which the country can maintain its life needs redetermination. After an upswing of business is under way again we shall be able to reappraise what is the wear and tear basis.

If attempts are ever made to consider operations in relation to so-called normal needs, it will be necessary to establish what is the normal. The term continually creeps into financial analyses of the industrial situation and gives the casual reader an incorrect conception.

The normal production of a basic material might be judged from the amounts shown over a term of years as going into consumption. In pig iron this has been an ever increasing tonnage, dependent not merely on the population but on the increasing uses demanded by what we call the advance of civilization. In the light of the records of production, we should need 780 lb. of pig iron per person for 1921, yet the year's output will be less than 45 per cent of this amount. Seeing that in 1920 production was 2 per cent above the apparent normal for that year, and that in 1919, the first full year after the swollen output of the war period, production was only 11 per cent below the apparent normal, it is perhaps hardly surprising that demand has been relatively so low this year. Disregarding surface conditions, the relatively

heavy per capita outputs of 1919 and 1920 left for 1921 a slowing up until supplies could be absorbed and until demand and production could approach a parity.

Normal needs of pig iron for 1921 may be put at 37,000,000 gross tons, so that the year's theoretical deficiency is about 20,000,000 tons, or several times what we regarded as the theoretical surplus on Jan. 1, 1921, resulting from the stimulated pig-iron making of the war period and afterward. Figures leave the conclusion that under long continued depression there is a storing up of needs against a new intensity of manufacture once the change of sentiment in business occurs, for the theoretical requirements of 1922 are 38,500,000 gross tons and there can hardly be a theoretical surplus to-day.

Thrift and Progress

The buying activities of a people fall into two categories, those represented by current consumption, the consumption of materials and the utilization of service, and those represented by the accumulation of facilities of lasting character, which will continuously furnish comfort or enjoyment. In the household, a can of tomatoes or a pound of coffee falls in the first category, an electric smoothing iron or a carpet in the second category. In governmental affairs the Congressional Record falls into the one category, a new postoffice building into the other. In industry generally, mining coal, once the mine is equipped, is similarly distinguished from the erection of a modern economical power plant.

What is commonly known as "progress" in the affairs of a people is represented by additions like these to private, semi-public or public facilities. The aim of all peoples is, or should be, to make progress. It has been well understood in the past year that progress along these lines has not been at a normal rate. Much thought has been given, and many words have been used, in an effort to indicate the impediments that have stood in the way of normal progress being made. Upon two impediments much stress has been laid, while a third impediment has received little attention.

The first of the two much-mentioned impedi-

ments is high cost. Inasmuch as new facilities are installed for the purpose of rendering service in future, perhaps for many years, they represent an investment and the investor does not wish to see his investment greatly depreciate in replacement value by the cost declining in future. The principle applies similarly, though in varying degree, to an electric smoothing iron, a carpet, a power plant or an office building.

The second of the two much-mentioned impediments is the high income surtax in the federal taxation system, whereby the large investor or possible investor is not only taxed very heavily on his last dollar of taxable income but is prevented from securing an average return in a period of years because the good years are taxed heavily while in the poor years there is no refund.

These two impediments are important, but there is a third of no small importance, one that large investors no doubt have been taking into account. That is the change in the habits and ambitions of the people at large, whereby there is a disposition to spend more money than formerly on articles of current consumption and services of transient value, and less upon permanent facilities. Two impressive illustrations are the automobile and the cinema exhibition. There is current consumption of gasoline and tires and depreciation of the car itself, while the average film is old a few days after its release. It may be argued that when the people actually have the money to spend it really does not matter, but one can see that it does matter by reflecting on the large amount of the nation's productive labor that is expended in producing gasoline, tires and automobiles and in producing and exhibiting films. We are not working correspondingly harder than when we did not produce many automobiles and films, probably not nearly as hard.

The stress laid upon the two impediments to progress just mentioned would suggest that if the investor were offered a lower cost and a reduced tax, he would at once proceed to create great new facilities, but the investor might balk, on the ground that perhaps the public would not patronize his investment.

In other words, the habits of thrift of pre-war times are now not so much in evidence. Thrift is necessary if progress is to be made. For a time after the war, the absence of thrift was much commented upon and the condition was attributed to a psychological reaction from war-time conditions. It was assumed that the feeling would wear off. It is high time now to reflect that even in three years there has not been a full return to the pre-war attitude.

Business is pleased to note the activity taken by more than one agency looking to establish a demand for an international economic conference. Those on the outside think the executive department of the Government ought to take the initiative, as it did in the present political diplomatic conference. So far, the view obtains in Washington that either such a step is unwise or events have not proceeded far enough for a decision to

be reached. Put in a nutshell, world problems, after settling the question of naval disarmament, are economic and the help of men engaged in business, including finance and possibly farming, is needed. The political representatives are making the radical move of reducing naval expenditures, but it is vital, if the restoration of international credit be hastened, that the other expert be called to his responsibility and to his obligation. Selfish as well as altruistic reasons call for the economic conference and call for it as early as possible.

Hardwood Association Case

A study of the complete text of the decision of the Supreme Court of the United States in the so-called Hardwood Lumber case strengthens the opinion expressed in these columns last week that there is nothing in the decision to prevent trade associations from carrying on their work, provided they do not attempt, directly or indirectly, to influence prices. It would indeed be unfortunate if, at this time when the Government and business are co-operating more closely than ever, anything should interfere with that co-operation. One of the latest efforts in that direction has been represented by a meeting of Secretary Hoover with engineers, architects and contractors in an effort to bring about standardization of construction contracts. At this meeting it was pointed out that there are in common use over 250 different forms of contract throughout the construction industry and that no one State or section has been able to establish any one form as standard or customary. Secretary Hoover expressed the belief that standardization offers a great field not only in protection to the public but in the general improvement of ethics in the industry itself. There is not the slightest suggestion of attempting to control prices and it is difficult to see how, except in the imagination of interested attorneys, the decision in the Hardwood case can have any relation to such efforts.

The Hardwood association had a very able and energetic "manager of statistics" and it is clear that he lost no opportunity to show the members of the association the advantages of keeping down production and keeping up prices, as Justice Clarke pointed out in his decision. Constantly throughout the minutes of the various meetings of the association there is shown a discussion of the stock and production reports in which the shortage of supply was continually emphasized with the implication, not disguised, that higher prices must result. "Men in general are so easily persuaded," said Justice Clarke, "to do that which will obviously prove profitable that this reiterated opinion from the analyst of their association, with all obtainable data before him, that higher prices were justified and could easily be obtained, must inevitably have resulted, as it did result, in concert of action in demanding them." Repeatedly at the meetings, in the strongest possible terms, the danger of operating mills to such an extent as to affect prices is dwelt upon.

Letters of the manager of statistics threw a

flood of light on his activities. For example, in one stock report he tells how it can be said "to the eternal credit of the hardwood producers, that they have maintained a stout heart and stiff backbone; with the result that there has been exhibited a strength in the market which has been little short of remarkable in the face of the light demand and the vigorous efforts which have been steadily made to hammer down prices." Evidently, not merely a comparison of prices but also the comments upon the price charts and production played an important part in bringing the court to its decision, which indicates very clearly what business associations ought not to attempt to do.

A Poor Coal Year

In the fortnight ended December 10 the production of bituminous coal was at the lowest rate since last April, whereas in normal times the highest rate of production in the year would be seen. It may be worth while to reflect that circumstances have failed to justify the cry made earlier in the year that consumers should stock coal in the summer, lest they be freezing at this time. The existing condition also furnishes a commentary on the seasonal coal freight rate plan, whereby rates were to be lower in summer than in winter, to furnish the consumer a pecuniary reason for laying in stocks. The consumer has been looking for a general reduction in freight rates and is also in expectation that coal prices will be lower on account of revision in the union mining scale. Also, he was in the mood last summer to feel that if the state of his business required him to consume much coal this winter, he would be able to pay the necessary price, while if he accumulated coal that he found he could not use he would be in an unfortunate position. It is plain in the retrospect that the seasonal coal freight rate system would not have worked advantageously this year.

The present estimate is that production of bituminous coal this year will not prove in excess of 405,000,000 tons, and such an output is regarded as representing a very great recession. It is, as a matter of fact, 150,000,000 tons or 27 per cent less than the output in 1920 and 175,000,000 tons or 30 per cent less than the record output, made in 1918, in which year there was a very material accumulation of stocks.

Some industries show greater fluctuations in activity than others and it may be interesting to compare coal with steel. The steel ingot output this year will probably prove to be a trifle under 20,000,000 tons, representing about double the recession shown by coal. By another method of comparison, the 1921 steel output is equal to the output in 1905, then a record tonnage, representing a 16-year recession, while the coal output represents a recession to a point between 1909 and 1910, or a recession of between 11 and 12 years.

Such a difference is to be attributed to coal being more an article of ordinary every day con-

sumption than is steel. Both are used for the separate purposes of current operation and of improvement, but steel runs proportionately more to the latter than does coal.

The general activity of the country can be observed from various viewpoints. One is the freight ton-mileage of the railroads. That index shows the current year to be one of about 335 billion ton-miles of revenue and non-revenue movement, representing a recession of only about 25 per cent from the record, which was made in 1920, while in point of time it represents a recession only to a period between 1915 and 1916, or say five and a half years, against about 11½ years for coal and 16 years for steel.

Thus the railroad industry is a steadier one than the coal industry, and the coal industry is steadier than the steel industry. One is inclined to assume that it is on account of its sensitiveness that iron or steel is so frequently looked upon as the barometer of trade.

Wage Settlement on Industrial Prospects

Wage readjustments which take into account not only the cost of living factor but the conditions facing the specialized industry are arranged periodically by certain of the printing crafts of New York. Presumably the cost of living items could be based on the findings regularly published by the National Industrial Conference Board. It remains to ascertain what is the outlook factor. In the case cited, 200 employers are concerned. A questionnaire was sent to them to learn the promises of the future. The investigation was delegated to three accountants, one representing the employers, the second the employees, with the third serving as a neutral. Nearly 65 per cent of the questionnaires were returned, but 24 was the final number which could be used as throwing light on the question. These replies were considered sufficiently representative and therefore valid.

So far, the plan is claimed to work and it is worth reporting as a suggestion for like co-operation in the wage settlement of a local group of craftsmen. However, when the cost of living ceases to be widely fluctuating, there would then remain as the only basis of settlement the estimate of what the industry may or may not afford to do. Prophecy, difficult even for the economists, puts the scheme on a shaky footing. Dependence largely on the cost of living basis is not likely to become the vogue any more than it was before living costs were a thing of concern. If the attempt is to approach a scientific base, factors may well be included to compensate the individual worker. There is his proficiency, resourcefulness, punctuality, reliability, experience and possibly the term of his employment. Such a basis has been tried by a single employing company and no recourse was necessary to any arbitration board of accountants, which is likely to amount in operation to the conference of a judge flanked by two advocates. At best, the wage adjustment

system calling for the three arbitrator plan is not likely to remain satisfactory, no matter what is the basis of the briefs the arbitrators are to consider.

Sulphur in Ordnance Steel

New light is thrown on the subject of sulphur in steel by an abstract, elsewhere in this issue, of a paper on naval ordnance steel. There is also clearly brought out the difference between good and bad electric steel. The entire paper is a valuable contribution to the literature of the possibilities of the electric furnace when operated as it should be.

The meeting of the specifications for ordnance gun steel has for a long time been a *bête noire* of steel makers. This has been particularly true of even acid open-hearth steel as well as of some electric steel. The great difficulty has been, not so much the tensile strength or elastic limit of the ductility as measured by the elongation and reduction of area, especially on the tangential tests. The author shows that, in properly made electric steel, a lowering of the presence of sulphides and oxides contributes a product which, even in the severest tests, such as tangential, has ductile and other qualities which are superior.

On the subject of snowflakes in steel, which were a source of so much controversy and so many rejections during the war, the author states that electric steel can develop these, unless properly made. His explanation for them is: casting at too high a temperature. If this is the true solution, then genuine snowflakes are not likely to develop in carefully made acid open-hearth steel. In fact, one plant making large guns of acid open-hearth steel during the war claims to have had no trouble from such defects.

One of the future possibilities of the electric furnace is quality steel in quantity, especially with the advent of the larger units. A conclusion to be drawn from the author's paper, however, is that no matter what the process, electric or open-hearth, the product may be quantity and not quality, unless the best possible practice rules.

St. Louis Labor Conditions

ST. LOUIS, Dec. 27.—The labor situation in this district is reflected in the following table compiled by the Eighth Federal Reserve Bank from 210 leading employers in 21 of the largest cities of the district.

	Wage Earners Per Cent of					
	Men	Women	Total	Normal	Normal	Pay Roll
Nov. 1, 1921.	150,727	21,813	172,540	208,163	—17.1	\$12,572,110.67
Oct. 1, 1921.	148,492	18,753	167,245	203,219	—17.7	12,572,533.84
Nov. 1, 1920.	180,156	22,120	202,276	208,163	—2.8	16,981,748.17

From the above tabulation it will be noted that the number of employees of the reporting interests decreased 29,736 or 14.7 per cent (men 16.3 per cent and women 1.4 per cent) between Nov. 1, 1920, and Nov. 1, 1921. On Nov. 1, 1920, the number was 2.8 per cent under normal and on Nov. 1, 1921, the total was 17.1 per cent under normal. Wages, figures on a semi-monthly basis, decreased \$4,409,637.50, or 25.9 per cent, between Nov. 1, 1920, and Nov. 1, 1921.

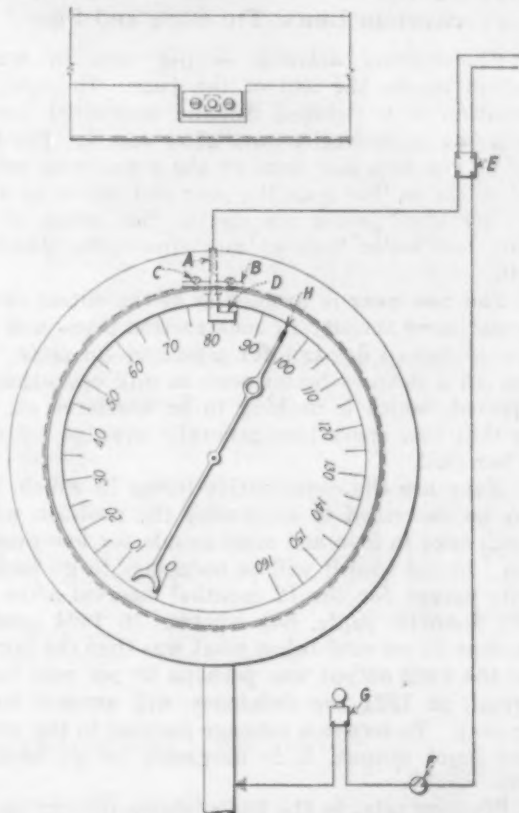
On July 1, 1921, the total of wage earners was 27.4 per cent under normal, on Aug. 1, 1921, 23.1 per cent under normal and on Sept. 1, 1921, 16.4 per cent under normal.

CORRESPONDENCE

Making a Gage to Signal Danger

To the Editor:—The accompanying sketch shows how I connected an air gage in my office to a buzzer, so that when the air pressure goes down to 80 lb. the buzzer will attract attention. It is a common thing for the superintendent or master mechanic to have gages showing pressure of steam, air, water, oil, etc., in his office, but they do not mean anything unless there is something to tell him when pressures are down.

It can be arranged so that a buzzer or bell will give warning when any certain pressure has been reached.



A Buzzer Gives Warning When the Pressure Drops to 80 Lb.

A slot was cut in the cast-iron base opposite the 80 lb. pressure mark to take a fibre (B). A $\frac{1}{4}$ -in. piece of copper wire (A) was threaded and one end soldered to a piece of 0.005 sheet copper (D). A hole was drilled in the fibre (B) and the copper wire was pushed through the fibre and a nut run down to hold it in place. Then the fibre was fastened to the base with two small screws (C), as shown. The hand (H) was soldered slightly on the end to make a good contact with (D), which was bent to give just enough tension to make contact and to hold the hand (H) only while the pressure is between 75 and 85 lb.

The power was taken off the lighting circuit to a small General Electric transformer (E) which reduced the voltage so that the current in the secondary circuit is 12 amperes. One wire extended from the transformer (E) to the copper wire (A) and one wire from (E) to the snap switch (F); then continued from (F) to the buzzer (G) and from (G) to the air pipe, which is the ground wire.

The snap switch (F) was arranged conveniently near my desk so that when the pressure would dance around 80 lb. and ring the buzzer continually, it could be shut off until the pressure was brought up again.

This has saved a great deal of time and trouble as sometimes the men in the shop would not know what was wrong with their machines until the pressure would get so low that they could hardly operate at all.

E. J. EDWARDS,
Superintendent foundry maintenance, Erie Works,
General Electric Co.

Iron and Steel Markets

PIG IRON BUYING

Year End Activity at Expense of Prices

Steel Operations Low—Promise Lies in Construction Lines, Tin Plate and Pipe

Encouraging activity in pig iron in several centers marks the end of the year. In steel, the condition is a reduced demand accounted for by deferring of deliveries until after Jan. 1. The buying of pig iron has been at the expense of prices, but so far as that goes the year end shows an average for steel prices not merely the lowest of the year, but lower than at any time since January, 1916.

The new year is promising at the outset chiefly in continued activity in construction lines, and also in a sustained demand for pipe and tin plate. By Jan. 15 a definite betterment in mill operations is expected, which is nothing to be wondered at, seeing that now operations generally average not over 30 per cent.

Many are the comparative terms in which 1921 may be described to emphasize the position which it will take in iron and steel annals for low production. In pig iron it will be necessary to go back 17 years except for the 12 months' interval after the 1907 financial panic, but whereas in 1904 production was 15 per cent below what was then the normal and the 1908 output was perhaps 30 per cent below normal, in 1921 the deficiency will amount to 55 per cent. To secure a tonnage parallel to the year's steel ingot output, it is necessary to go back to 1905.

Pig iron sales in the Philadelphia district in the past two weeks have amounted to 50,000 tons and some of the tonnage went as low as \$18, furnace, although most of it was sold at \$19 to \$19.50. On sales of fair volume in the Chicago market, prices receded 50c. and prices of Southern iron are down 50c., or to \$17, Birmingham. Lower prices have also been made in the Cleveland market.

The immediate effect of the Steel Corporation's reduction of \$5 a ton on wire products in the few days since it was made, on Dec. 21, has been to stop buying. Wire makers generally have met the price. Its reduction of \$3 per ton in wire rods brings the corporation price to that which has been named for some weeks by independent producers.

Tin plate makers do not expect to stock as much product as usual in the first quarter, can companies showing a disposition to anticipate needs and prices remaining firm.

The prices on pipe, reduced Dec. 15, are holding well, but so little business is there in steel boiler tubes that an extra 5 per cent is allowed by several of the smaller makers. Practically all charcoal boiler-tube plants suspended operations several weeks ago.

Little encouragement was given to the rail makers. Not only have few new orders been entered, but specifications against existing contracts are not supplied with much freedom, and a good deal of production is being stocked. The Erie has placed 7000 tons with two mills, and the Kansas City

Southern 6000 tons, and fresh inquiries have appeared or are promised covering 67,500 tons, of which 50,000 tons is for the Louisville & Nashville.

In comparison with the diminished scale of shipments on domestic orders, exporting is proportionately larger. Japan is largely responsible. On the record of the first 11 months of this year 64 per cent of the steel sheets went to Japan. That country took more rails than any other country, probably buying 50,000 tons, and was third to Mexico and India in the absorption of welded pipe. It is now actively negotiating for 16,500 tons of rails, 13,000 of these for Government railways and the remainder for an electric railroad line.

An American company will provide some \$12,000,000 worth of machinery and equipment for removing a hill in Rio de Janeiro.

With 5000 tons of fabricated steel awards and only 2500 tons in new projects, structural mills nevertheless look for a continuance of the fair buying rate of the last three months. Reinforcing bars from new steel have sold at a price corresponding to 1.45c., Pittsburgh, and some fabricators have covered plates, shapes and bars at an equivalent of 1.425c., Pittsburgh. Rivet prices of \$1 a ton below the general market have been named.

THE IRON AGE finished steel composite price is now 2.062. per lb. The pig iron figure, \$18.68, is lower than any other for the year, with the sole exception of that (\$18.51½) for Aug. 9. These two figures are the lowest since September, 1916.

Pittsburgh

PITTSBURGH, Dec. 27.

The fag end of the year shows limited activity in iron and steel as regards both buying and plant operation. There is the seasonal factor embodied in the desire of all consumers that their year end inventories shall show a big cash item and a small one in materials.

The past week has been the lightest as far as business and mill operations are concerned since July. A number of independent plants both here and in the nearby districts shut down last Saturday night and will remain down until after Jan. 2. The general expectation is that not much activity will develop until along about the middle of January. Fairly steady operations are expected after that, as in the meantime the mills have had a chance of accumulate orders.

A relatively good business still is being done in steel pipe and a revival of Japanese buying of light gage sheets has somewhat enlivened that market, more especially as far as the American Sheet & Tin Plate Co. is concerned. The recent reduction of \$5 per ton in wire products, which applies to unshipped orders as well as new business, has been without effect upon the demand. In heavier products, little is going on. Activity also is lacking in semi-finished steel and the pig iron market has developed little in the way of new features since a week ago. There seems to be an outlet at well sustained prices for the better grades of open-hearth scrap. Putting out of a number of ovens in the Connellsville district has resulted in a slightly steadier market in beehive oven coke.

Pig Iron.—Interest in the market on the part of consumers of all grades has been extremely low in the past week and in the absence of important transactions, it is impossible to make any change in prices. Most of

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Dec. 27, 1921	Dec. 20, 1921	Nov. 29, 1921	Dec. 28, 1920
No. 2X, Philadelphia...	\$21.34	\$21.34	\$22.34	\$24.79
No. 2, Valley furnace...	19.50	19.50	20.50	25.00
No. 2 Southern, Cin'tit...	21.50	21.50	22.50	42.50
No. 2, Birmingham, Ala.†	17.00	17.50	18.00	38.00
No. 2 foundry, Chicago*	19.00	19.50	20.00	33.00
Basic, del'd, eastern Pa...	20.25	20.25	21.00	33.86
Basic, Valley furnace...	18.25	18.25	19.00	33.00
Bessemer, Pittsburgh...	21.96	21.96	21.96	36.96
Malleable, Chicago*	19.00	19.50	20.00	33.50
Malleable, Valley...	20.00	20.00	20.00	35.00
Gray forge, Pittsburgh...	20.96	20.96	21.46	35.96
L. S. charcoal, Chicago...	31.50	31.50	31.50	43.50
Ferromanganese, del'd...	60.00	60.00	60.00	110.00

Rails, Billets, etc., Per Gross Ton:	Dec. 27, 1921	Dec. 20, 1921	Nov. 29, 1921	Dec. 28, 1920
O.-h. rails, heavy, at mill...	\$40.00	\$40.00	\$40.00	\$47.00
Bess. billets, Pittsburgh...	29.00	29.00	29.00	43.50
O.-h. billets, Pittsburgh...	29.00	29.00	29.00	43.50
O.-h. sheet bars, P'gh...	30.00	30.00	30.00	47.00
Forging billets, base, P'gh	32.00	32.00	32.00	51.00
O.-h. billets, Phila...	33.74	33.74	34.74	49.24
Wire rods, Pittsburgh...	38.00	38.00	40.00	57.00
Skelp, steel, Pittsburgh...	1.50	1.50	1.50	2.65
Light rails at mill...	1.55	1.55	1.55	3.00

Finished Iron and Steel, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia...	1.85	1.85	1.95	3.85
Iron bars, Chicago...	1.60	1.60	1.65	3.25
Steel bars, Pittsburgh...	1.50	1.50	1.50	2.35
Steel bars, Chicago...	1.60	1.60	1.60	2.73
Steel bars, New York...	1.88	1.88	1.80	2.73
Tank plates, Pittsburgh...	1.50	1.50	1.50	2.65
Tank plates, Chicago...	1.60	1.60	1.60	3.03
Tank plates, New York...	1.83	1.83	1.88	3.03
Beams, etc., Pittsburgh...	1.50	1.50	1.50	2.45
Beams, Chicago...	1.60	1.60	1.60	2.83
Beams, New York...	1.88	1.88	1.88	2.83
Steel hoops, Pittsburgh...	2.00	2.00	2.00	3.05

*The average switching charge for delivery to foundries in the Chicago district is 70c. per ton.

†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

The above prices are for domestic delivery and do not necessarily apply to export business.

Sheets, Nails and Wire, Per Lb. to Large Buyers:	Dec. 27, 1921	Dec. 20, 1921	Nov. 29, 1921	Dec. 28, 1920
Sheets, black, No. 28, P'gh	3.00	3.00	3.00	4.35
Sheets, galv., No. 28, P'gh	4.00	4.00	4.00	5.70
Sheets, blue an'd, 9 & 10	2.25	2.25	2.25	3.55
Wire nails, Pittsburgh...	2.50	2.75	2.75	3.25
Plain wire, Pittsburgh...	2.25	2.50	2.50	3.25
Barbed wire, galv., P'gh...	3.45	3.40	3.40	4.10
Tin plate, 100-lb. box, P'gh	\$4.75	\$4.75	\$4.75	\$7.00

Old Material, Per Gross Ton:	Dec. 27, 1921	Dec. 20, 1921	Nov. 29, 1921	Dec. 28, 1920
Carwheels, Chicago...	\$15.50	\$15.50	\$16.50	\$22.00
Carwheels, Philadelphia...	16.50	16.50	17.00	25.00
Heavy steel scrap, P'gh...	14.50	14.50	14.00	15.00
Heavy steel scrap, Phila...	11.50	11.50	11.50	14.50
Heavy steel scrap, Chicago	11.00	11.00	12.00	15.50
No. 1 cast, Pittsburgh...	16.00	16.00	16.50	25.00
No. 1 cast, Philadelphia...	16.50	16.50	17.50	22.50
No. 1 cast, Ch'go (net ton)	12.50	12.50	13.00	13.50
No. 1 RR. wrot, Phila...	14.50	14.50	15.50	20.00
No. 1 RR. wrot, Ch'go (net)	10.25	10.50	11.50	14.00

Coke, Connellsville, Per Net Ton at Oven:	Dec. 27, 1921	Dec. 20, 1921	Nov. 29, 1921	Dec. 28, 1920
Furnace coke, prompt...	\$2.75	\$2.75	\$2.75	\$5.50
Foundry coke, prompt...	3.75	3.75	4.00	6.50

Metals, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York...	13.87½	13.87½	13.50	13.75
Electrolytic copper, N. Y.	13.62½	13.62½	13.37½	13.25
Zinc, St. Louis...	4.82½	4.90	4.65	5.60
Zinc, New York...	5.17½	5.25	5.15	5.60
Lead, St. Louis...	4.37½	4.40	4.35	4.50
Lead, New York...	4.70	4.70	4.70	4.50
Tin, New York...	32.75	33.00	29.87½	33.50
Antimony (Asiatic), N. Y.	4.50	4.50	4.50	5.25

Composite Price, Dec. 27, 1921, Finished Steel, 2.062c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets	These products constitute 88 per cent of the United States output of finished steel.	Dec. 20, 1921, 2.098c. Nov. 29, 1921, 2.135c. Dec. 28, 1920, 3.082c. 10-year pre-war average, 1.684c.
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Composite Price, Dec. 27, 1921, Pig Iron, \$18.68 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham	Dec. 20, 1921, \$18.85 Nov. 29, 1921, 19.56 Dec. 28, 1920, 34.13 10-year pre-war average, 15.72
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the steel makers in this district who buy their pig iron have shut down their plants for the holidays and are not much interested in the market. The foundries are taking on supplies only as needed and this means only carload lot buying of foundry iron. Sanitary ware and radiator manufacturers seem to have covered their immediate requirements, and also are only slightly interested. Producers of iron are not anticipating much contracting for the first quarter of the new year, but rather expecting that because of the effect upon prices of the expected reduction in railroad freight rates, melters will continue to buy closely to actual requirements.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.96 per gross ton:

Basic	\$18.25
Bessemer	20.00
Gray forge	\$19.00 to 19.50
No. 2 foundry	19.50 to 20.00
No. 3 foundry	19.00 to 19.50
Malleable	20.00

Ferroalloys.—There has been some activity in the local ferromanganese market in the last few days. The United Alloy Steel Corporation, Canton, Ohio, which has had out an inquiry for 1000 tons for next year's

delivery, has finally closed with the local producer for that quantity at the price of \$60 per ton, Pittsburgh, buyer to pay the freight to Canton. The Weirton Steel Co. has also closed for 150 tons 78 to 82 per cent material with the local producer at \$60, Pittsburgh, plus freight of \$1.82 to Weirton, making the delivered price \$61.82 per gross ton. A local open-hearth steel concern is in the market for 100 tons of 50 per cent ferrosilicon, and this may be closed before the end of the year. There is considerable demand for ferroalloys, but it is believed that a good deal of the inquiry is to get correct ruling prices for inventory purposes. In regard to ferromanganese a local producer seems to be taking practically all of the new business offered in the Pittsburgh, Wheeling, Youngstown and other nearby districts. The delivered prices on ferromanganese of the local producer is from \$2 to \$3 per ton under the prices at which domestic and foreign material can be laid down at the various points of delivery. The fact that prompt shipments can be made by the local producer is also a factor, so that foreign and domestic, the latter made by producers away from Pittsburgh, have very little chance in this market at

the present time. Domestic and foreign makers are still quoting \$58.35, c.i.f. Atlantic seaboard, and German, which, however, runs only 76 to 80 per cent, is still offered at \$54 seaboard, and no sales are being made. The price on 50 per cent ferrosilicon seems to be a little weaker, and several small sales have been made at \$54 delivered, or slightly under that price. The market on spiegeleisen and ferrosilicon on low percentages is very dull, but prices are held fairly firm. It is stated that stocks of consumers are lower now than for many months.

We quote 78 to 82 per cent domestic ferromanganese at \$60 to \$63.67 delivered; 78 to 82 per cent foreign ferromanganese, \$58.35, c.i.f. Atlantic seaboard; German, for 76 to 80 per cent, \$54, seaboard. Average 20 per cent spiegeleisen at \$30 delivered, Pittsburgh or Valleys; 50 per cent ferrosilicon, domestic, \$54 to \$57, freight allowed. Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, \$38.50; 11 per cent, \$41.80; 12 per cent, \$45.10; 13 per cent, \$49.10; 14 per cent, \$54.10; silvery iron, 6 per cent, \$27; 7 per cent, \$28; 8 per cent, \$29.50; 9 per cent, \$31.50; 10 per cent, \$33.50; 11 per cent, \$36; 12 per cent, \$38.50. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is \$4.06 per gross ton.

Billets, Sheet Bars and Slabs.—There is so little going on that prices are very indefinite. The more common quotation is \$30, Pittsburgh or Youngstown, for sheet bars, slabs and 4-in. billets, but that price has found little or no basis in sales recently and since billets are offered at \$29 by some makers, that probably is as high as any business can be done. It is doubtful if a firm bid of \$29 for sheet bars or slabs would be turned down.

We quote 4 x 4 in. soft Bessemer and open-hearth billets at \$28 to \$30; 2 x 2 in. billets, \$30; Bessemer and open-hearth sheet bars, \$30; slabs, \$30; forging billets, ordinary carbons, \$32 to \$35, all f.o.b. Youngstown or Pittsburgh mills.

Wire Rods.—The new schedule of prices of the American Steel & Wire Co., effective Dec. 22, reducing quotations \$3 per ton, merely meets the prices which previously have been done by independent companies. All makers now are quoting a base of \$38, Pittsburgh or Youngstown for No. 5 common soft rods, but since this is no reduction to customers of independent companies there naturally has been hesitation among these consumers. The market really is rather unsteady and the appearance of sizable inquiries probably would develop recessions.

Structural Material.—Few structural awards of any considerable size are being placed with shops in this district and this makes for a dull market in plain material. So little is going on that prices are poorly defined. Quotations still range from 1.50c. to 1.60c. on structural beams, but only retail lots are bringing more than the lower figure. The McClintic-Marshall Co. has taken 250 tons for a warehouse for the H. J. Heinz Co., Pittsburgh, and 300 tons for a coal handling plant for the Ashland Coal & Coke Co., Ashland, W. Va., placed through the Pittsburgh Coal Washer Co., Pittsburgh. The Jones & Laughlin Steel Co. will fabricate 225 tons of tramway towers for the United States Smelting, Refining & Mining Co., for shipment to one of the Mexican properties of that company. Prices are given on page 1698.

Steel Rails.—The railroads are not specifying with much freedom against such orders as they have placed and a good deal of the current production of the Steel Corporation subsidiary here is being stocked. Demand for light rails is still moderate. Makers are quoting 1.60c. base, but are not adhering firmly to that figure when there is an order at stake.

We quote 25 to 45-lb. sections, rolled from new steel, 1.55c. to 1.60c. base; rolled from old rails, 1.50c. base; standard rails, \$40 per gross ton mill for Bessemer and open-hearth sections.

Iron and Steel Bars.—Demand is still on a tapering scale, but there seems to be a steadier tone to the market because of a realization that further concessions at this time probably would not result in orders. We regard the market as steady at 1.50c., Pittsburgh, on such tonnages as are coming from points that are not in competitive territory. With the Pittsburgh basing point largely disregarded, Pittsburgh mills would have to shade prices to get business at sources near other steel making centers, which have a lower freight rate than Pittsburgh. Reinforcing bars made from new steel have sold at 1.45c., and this price can be done again on desirable tonnages. Iron bars are slow and the

weaker tendency in other markets is not without effect upon local prices. As much as 2.25c. base is quoted on refined iron bars by Pittsburgh makers, but this is merely a negotiation quotation.

We quote steel bars rolled from billets at 1.50c.; reinforcing bars, rolled from billets, 1.45c. to 1.50c. base; reinforcing bars, rolled from old rails, 1.40c. to 1.45c.; refined iron bars, 2c. to 2.10c. in carloads, f.o.b. mill, Pittsburgh.

Plates.—There has been a decided decrease in the demand, which is directly traceable to the fact that tank builders are well protected against such orders as they have on their books, while new ones have been few in the past fortnight. Pittsburgh and Youngstown plate makers are not going below 1.50c. mill, but with makers in other centers ignoring the Pittsburgh basing point, business of the former is localized.

We quote sheared plates, 1/4 in. and heavier, tank quality, at 1.50c. to 1.60c. f.o.b. Pittsburgh.

Wire Products.—The announcement on Dec. 21 of the American Steel & Wire Co. reducing prices \$5 per ton, effective Dec. 22, was merely the public affirmation of prices which previously had been done by several of the independent companies, which apply also against unshipped orders. As yet the lower quotations have not been of much help to business. The new prices of the American Steel & Wire Co. are \$2.50, base per keg for bright nails, \$2.25 case 100 lb. for bright and annealed wire; \$2.75 for galvanized wire; \$2.15 for galvanized barbed wire and fence staples; \$2.65 for painted barbed wire and polished fence staples and \$2.10 for cement coated nails. One large independent is naming a price of \$2 base per count keg on cement coated nails. Other makers, although quoting \$2.10, are meeting competition.

We quote wire nails at \$2.50 base per keg, Pittsburgh, and bright basic and Bessemer wire at \$2.25 base per 100 lb., Pittsburgh.

Spikes.—Local makers say that the new demand is quiet, but some railroads are in the market with inquiries, probably largely for inventory purposes rather than with the idea of placing orders. Local makers say they have made practically no sales in the past week, and do not expect to do much until after the first of the year. Prices now in effect are given on page 1698.

Iron and Steel Pipe.—Although demands are smaller in all kinds of pipe as the end of the year approaches, business is good as compared with most finished products. Jobbers seem to be enjoying a good business in merchant pipe and find it necessary to specify pretty constantly to maintain their stocks. All of the large line pipe business for this year has been closed, but it is expected that soon after the turn of the year there will be additional awards against inquiries which now are pending. Business in oil well pipe could be better. There is very good observance of the Dec. 15 steel pipe card and no change in wrought iron pipe discounts, although the wide difference between steel and iron pipe occasions some anxiety among the makers of the latter, and there are intimations of a downward revision of prices after the turn of the new year. Discounts are given on page 1698.

Cold Finished Steel Bars and Shafting.—Makers report the local situation as extremely dull in demand, and one leading maker says he does not expect very much betterment in the new demand until April of next year. Practically no orders are coming in at this time from the automobile trade, and none is expected until pretty well after the turn of the year. It is stated that stocks held by automobile buyers, and also by the machinery trade, are sufficiently large to carry them over the next month or two, without any new buying. The severe declines in prices that have taken place in shafting and cold-finished steel bars, almost prohibit any lower prices, as makers say that even at present prices, there is no profit. Recently several sales of shafting were made at 2c. at mill, but these were fairly desirable orders under the present dull situation, and less desirable orders still bring 2.10c. to 2.15c. We therefore quote cold-finished steel bars and shafting at 2c. to 2.15c. at mill, the lower price being made only on the larger orders. Ground shafting still is quoted \$2.50 base per 100-lb. f.o.b. mill, in carload lots.

Boiler Tubes.—Demand for lap welded steel boiler tubes is steady enough, but apparently there is not enough business to give all makers a share and observance of the discount card is on the part of a few rather than the many. An extra 5 per cent is being given by several of the smaller makers. Charcoal iron boiler tubes are fairly firm, but practically all makers suspended operations several weeks ago and the only company active in this district is planning on an early shut-down. Discounts are given on page 1698.

Nuts and Bolts.—Local makers state that the quiet demand which has existed for some months has been accentuated by the inventory period, and almost no new business is being placed. There is no inclination on the part of large consumers or jobbers to anticipate their needs, and the present very light demand is only for small lots to meet current needs. Makers say that present discounts are holding firm, largely for the reason that not enough business is coming up to shade them, and further, that present prices are, and have been for some time, below actual cost of manufacture. Automobile makers are buying practically nothing, but are expected to come into the market early in the new year. On the present small orders being placed, discounts in the local market are holding fairly well and these are given on page 1698.

Rivets.—New demand is seasonably quiet, buyers not caring to place any new orders until after the turn of the year. Prices show no change, but on a very desirable order it is possible that the price of \$2.25 per 100-lb. on large structural and ship rivets, and \$2.35 on large boiler rivets might be shaded. However, local makers say they have not made any sales below these prices. Considerable buying is expected in rivets shortly after the first of the year. Prices are given on page 1698.

Sheets.—Business with all makers still is of moderate proportions because of the desire of consumers and jobbers to avoid heavy stocks and not much interest in future requirements is noted, presumably because of a desire to wait until the completion of the year end check up. The one bright spot in the situation is the revival of the Japanese demand for light gage sheets. This business calls for sheets of tin mill gages and dimensions and the bulk of it is going to the American Sheet & Tin Plate Co. because it possesses the best facilities for producing this material. In spite of the generally slow demand, there is remarkably close adherence to regular market quotations. The American Sheet & Tin Plate Co., last week, operated more than 65 per cent of its hot-sheet mills. Independents averaged about 40 per cent. This week's operations will be lower because of the holiday interruptions. Prices are given on page 1698.

Tin Plate.—New business does not amount to much, but orders covering the January requirements of container manufacturers are in and generally were accompanied by specifications. The first quarter of the year usually is a period of light consumption, but it is believed that the mills will not be obliged to stock as much production as usual during the next three months because it is doubtful that there will be any further decline in prices and the can companies are showing more of a disposition to anticipate their needs than they did a year ago.

We quote standard production coke tin plate at \$4.75 per base box f.o.b. Pittsburgh for carload lots.

Hoops and Bands.—The market is dull and irregular. On hoops makers are trying to maintain a base of 2.10c., Pittsburgh, but find it necessary to go to 2c. in some districts in competition with mills having a lower freight rate to the point of consumption. On bands, no recent business has been done above 1.90c. base, although the negotiation price of most makers is 2c.

Hot-Rolled and Cold-Rolled Strips.—Real activity still is lacking, particularly with regard to early shipment tonnages. There are still some makers who are quoting 2.25c., base, for hot-rolled and 4c., base, for cold-rolled, but the more common quotations are 2c. and 3.75c., and even these prices are being shaded on desirable orders.

Coke and Coal.—Two first quarter contracts for furnace coke, one of 12,000 tons a month and the other of 10,000 tons a month, have been closed in the past week. The larger contract, made by a Valley steel maker, went to a Connellsville producing interest, and while the details as to prices have not been made public, the common impression is that it carries a price of about \$3.25 per net ton oven. The other business went to a steel works by-product plant, but the price is withheld. Negotiations still are in progress covering the requirements of the furnace of the A. M. Byers Co., Girard, Ohio, calling for 15,000 tons per month, and for 18,000 tons a month for the Trumbull-Cliffs Furnace Co., Warren, Ohio. Negotiations also are in progress for several smaller lots of furnace coke, the price to be determined by THE IRON AGE quotation on prompt or spot tonnages. The company making this proposition feels that it is a more equitable plan than that of basing the price of coke on the price of pig iron. The spot market in furnace coke is slightly firmer, as the blowing out of a number of beehive ovens has considerably shortened the supply, and while some tonnages still are available as low as \$2.75 per net ton, oven, some recent business has been done as high as \$3. The spot market in foundry coke is quotable generally at \$3.75 to \$4, though choice brands still are selling up to \$4.25. A shortage of slack grade of coal, due to the fact that there is not much demand for or production of screened coal, has resulted in some stiffening of the price, recent sales having been done at \$1.80 to \$1.90. Mine run steam coal for prompt delivery is offered at \$1.40 to \$1.50 and mine run by-product from \$1.60 to \$1.85 for spot shipment and \$1.90 to \$2 for first quarter delivery. The spot market on gas coal, mine run grade, is \$2 to \$2.30.

Old Material.—There has been some considerable activity in selected heavy steel scrap in the local market in the past week. The National Tube Co. is credited with having bought upwards of 15,000 tons of selected heavy steel scrap for its Lorain, Ohio, works, while the American Steel & Wire Co. is said to have bought 10,000 tons or more for its Donora, Pa., works. These transactions were closed about a week ago, but since that time, demand has slowed down very considerably and very little new business is being placed. Consumers do not want to buy scrap until after the first of the year, and in addition, some large consumers have suspended shipments until after Jan. 1, among these being Republic Iron & Steel Co., Youngstown, Sharon Steel Hoop Co. for Sharon and Weirton Steel Co. for Weirton, W. Va., and probably others. Local dealers say they expect by Jan. 15 or Feb. 1, there will be considerable new movement in scrap, stocks in consumers' yards being reported as very low. There is very little demand for borings and turnings, and prices are largely nominal. Consumers will not pay over \$8 to \$8.50 for turnings and not over \$8.50 to \$9 for borings, prices quoted by dealers being about 50c. per ton higher. Prices, owing to the small amount of material sold in the past week or so, have shown no important changes.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate, as follows:

Heavy melting steel, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh.....	\$14.50 to \$14.75
No. 1 cast, cupola size.....	16.00 to 16.50
Re-rolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.	15.50 to 16.00
Compressed sheet steel.....	12.25 to 12.50
Bundled sheets, sides and ends.....	10.25 to 10.50
Railroad knuckles and couplers.....	15.00 to 15.50
Railroad coil and leaf springs.....	15.00 to 15.50
Low phosphorus standard bloom and billet ends.....	18.00 to 19.00
Low phosphorus plates and other grades.....	17.00 to 17.50
Railroad malleable.....	12.00 to 13.50
Iron car axles.....	25.00 to 26.00
Locomotive axles, steel.....	23.00 to 24.00
Steel car axles.....	15.50 to 16.00
Cast iron wheels.....	15.00 to 15.50
Rolled steel wheels.....	15.00 to 15.50
Machine shop turnings.....	8.50 to 9.00
Sheet bar crop ends.....	14.00 to 14.50
Heavy steel axle turnings.....	11.00 to 11.50
Short shoveling turnings.....	10.00 to 10.50
Heavy breakable cast.....	14.00 to 14.50
Stove plate.....	13.00 to 13.50
Cast iron borings.....	9.00 to 9.50
No. 1 railroad wrought.....	11.50 to 12.00

Chicago

CHICAGO, Dec. 27.

Mill operations are diminishing as the end of the year draws near, but this contraction in production does not reflect reduced demand so much as the desire of buyers to have deliveries deferred until January. In fact, one of the most important local producers reports that December bookings are larger than those of November. This is largely accounted for by the heavy individual tonnages which have been ordered by car builders and tank fabricators to apply against contracts which they secured some weeks ago. While some of this tonnage will not be rolled until January, enough of it has been released this month to sustain mill operations at a higher rate than would otherwise be possible, in view of the slump in general demand. Further business from the car and tank shops is not in immediate prospect, however, as the railroads have deferred action on pending inquiries for cars and no new tank work is reported. Notwithstanding this fact, the mills are not taking a gloomy view of the situation, as they expect jobbers and others who have withheld purchases during inventory taking to re-enter the market with the opening of the new year and close for a respectable tonnage. This buying will probably be confined to the replenishment of depleted stocks, as it is likely that caution will continue to actuate the policy of consumers until a general freight rate reduction has been made.

Except for a reduction in wire and wire nails announced by the leading producer, the price situation shows little change. Plates, structural shapes and bars are no weaker than heretofore and sheet prices remain firm. Whereas the situation in finished commodities, with the exception of wire products, remains in statu quo, pig iron has shown further weakness and has dropped another half dollar.

The Illinois Steel Co. still has 11 furnaces in blast, but has reduced its steel output to 40 per cent of ingot capacity. The Inland Steel Co. has shut down its sheet mills and its continuous bar mill between the holidays, but expects to resume at a 50 per cent rate early in the new year.

Pig Iron.—With spot buying at a low ebb, attention is centered on first quarter and first half business. Some good-sized tonnages for those deliveries have been closed and the terms of the transactions indicate further weakness in the market. A northern Indiana melter bought 1000 tons of foundry at \$19 base furnace for first quarter delivery, while another Indiana consumer closed for 750 tons for first half shipment at less than that price. In fact, a local user who purchased 2000 tons of foundry for January delivery is reported to have placed the order at \$18 base, local furnace. Considerable first quarter and first half tonnage is still pending and several new inquiries are reported, including one from a local manufacturer for 300 tons of malleable for delivery during January and February to a branch plant at Indianapolis and another of 300 tons of foundry from a northern Illinois melter for first quarter shipment. Sellers look for better business in the early months of the new year, as the stocks of most melters, except the implement manufacturers, are low and operations are sufficiently active to make some replenishment buying necessary.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include a switching charge averaging 70c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago.....	\$31.50
Northern coke, No. 1, sil. 2.25 to 2.75.....	\$19.50 to 20.00
Northern coke, foundry, No. 2, sil. 1.75 to 2.25.....	19.00 to 19.50
Northern high phos.....	19.00 to 19.50
Southern foundry, sil. 1.75 to 2.25.....	24.17
Malleable, not over 2.25 sil.....	19.00 to 19.50
Basic.....	19.00 to 19.50
Low phos., Birmingham.....	32.00
Low phos., Valley furnace, sil. 1 to 2 per cent copper free.....	33.00
Silvery, sil. 8 per cent.....	32.82 to 34.82

Ferroalloys.—The market is inactive.

We quote 78 to 82 per cent ferromanganese, \$66.75, delivered; 50 per cent ferrosilicon, \$60, delivered; spiegeleisen, 18 to 22 per cent, \$36 to \$37, delivered.

Rails and Track Supplies.—Two more rail orders have been received by the Gary mill, one for 6000 tons from the Kansas City Southern and another for 4000 tons from the Erie. The railroads are evincing little interest in track fastenings for the time being. Among the few orders reported is one for 40,000 iron tie plates. The price situation shows little change, tie plates being slightly weaker as low as \$37.50 per net ton, f.o.b. mill having been done.

Standard Bessemer and open-hearth rails, \$40; light rails rolled from new steel, 1.70c. to 1.75c. f.o.b. makers' mills. Standard railroad spikes, 2.15c. to 2.25c., Pittsburgh; track bolts with square nuts, 3.20c. to 3.25c., Pittsburgh; tie plates, steel and iron, 1.875c. to 2c., f.o.b. mill; angle bars, 2.40c., f.o.b. mill.

Railroad Equipment.—The Illinois Central, Burlington, Great Northern and Union Pacific have deferred action on their inquiries for cars and locomotives until January. The Central of New Jersey has ordered 25 mikado type locomotives from the American Locomotive Co.

Bars.—Except for tonnage coming from carbuilders, little new business in mild steel bars has developed. In the reinforcing field, considerable work is in prospect, but it will not come up for bids until next year. An alternate all-reinforced concrete design of warehouse No. 12 for the Belknap Hardware & Mfg. Co., Louisville, Ky. will call for a large tonnage of bars. Even in the structural steel design now in the hands of fabricators some tonnage of reinforcing bars is specified. At Memphis, Tenn., a hospital and an auditorium and market building are proposed and both of these projects will require a round tonnage of reinforcing. Bids on the general contract for the Grant Park stadium Chicago, requiring 2700 tons of reinforcing, have been rejected. Bar iron mills report their bookings somewhat improved although the tonnage coming in is far from sufficient to put them on a satisfactory operating basis. In hard steel bars pending business includes:

Reinforcing bars for new tuberculosis sanatorium at National Soldiers' Home, Milwaukee, 500 tons. Bids being taken by H. Schmitt & Son, Inc., 430-432 Farwell Avenue, Milwaukee, successful bidder on general contract at \$1,094,000.

Mill prices are: Mild steel bars, 1.60c. to 1.75c., Chicago; common bar iron, 1.60c. to 1.65c., Chicago; rail carbon, 1.65c., mill or Chicago.

Jobbers quote 2.68c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 3.55c. for rounds and 4.05c. for flats, squares and hexagons. Jobbers quote hard and medium deformed steel bars at 2.38c. base. Hoops and bands, 3.28c.

Wire Products.—The American Steel & Wire Co. has announced reductions in wire and nails the new quotations being \$2.50 base per keg on wire nails, \$2.25 per 100 lb. on bright Bessemer and basic wire, and \$2.10 per count keg on cement-coated nails. The same prices have been adopted by a number of independents. New business is light both from the railroads and the jobbers. The stocks of the latter are very low, however, and they are expected to come into the market in January.

We quote warehouse prices f.o.b. Chicago: No. 9 and heavier black annealed wire, \$3.13 per 100 lb.; No. 9 and heavier bright basic wire, \$3.28 per 100 lb.; common wire nails, \$3.25 per 100 lb.; cement coated nails, \$2.65 per keg.

Sheets.—Mills are holding firmly to the quotations named below but they are booking little new business. The mills of the local independent have been shut down for the holidays to permit the plant to be cleaned up after several months of capacity operation. Consumers' stocks, and particularly those of jobbers, are seriously depleted and better buying is therefore expected early in the new year.

Mill quotations are 3c. for No. 28 black, 2.25c. for No. 10 blue annealed and 4c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight to Chicago of 33c. per 100 lb.

Jobbers quote: Chicago delivery out of stocks, No. 10 blue annealed, 3.38c.; No. 28 black, 4.15c.; No. 28 galvanized, 5.15c.

Plates.—December steel bookings of local mills have been heavier than was generally supposed, one pro-

ducer reporting them larger than those of November. Much of this tonnage has been ordered to cover the needs of carbuilders and tank fabricators who secured large contracts several weeks ago. No new lettings of oil storage tanks are reported, however, and action on pending inquiries for freight cars has been deferred until next month. The price situation is unchanged and sellers find encouragement in the fact that no further weakness has developed. Attractive business in plates, shapes and bars is moving at about 1.60c., Chicago, while exceptionally desirable tonnages are still being placed at concessions of from \$1 to \$2 a ton.

The rolling mill quotations range from 1.60c. to 1.75c. Chicago. Jobbers quote 2.78c. for plates out of stock.

Bolts and Nuts.—A number of orders have been taken recently from manufacturers of bolted tanks who are busy supplying temporary oil storage in the new Mexia (Texas) field. Little business is coming from the automobile manufacturers and the jobbers, and railroad inquiries have dropped off. Word has been received from Detroit to the effect that the leading maker of cheap automobiles stopped production on Dec. 20, and will not resume until the second week in January. The price situation is still weak and confused. For mill prices, see finished iron and steel, f.o.b. Pittsburgh, page 1698.

Jobbers quote structural rivets, 3.43c.; boiler rivets, 3.53c.; machine bolts up to $\frac{3}{4}$ x 4 in., 60, 10 and 10 per cent off; larger sizes, 60 and 10 off; carriage bolts up to $\frac{3}{4}$ x 6 in., 60 and 10 off; larger sizes, 55 and 5 off; hot pressed nuts, square and hexagon tapped, \$3.75 off; blank nuts, \$4 off; coach or lag screws, gimlet points, square heads, 65 and 6 per cent off. Quantity extras are unchanged.

Cast-Iron Pipe.—The market is exceedingly quiet with the arrival of the holiday period, but considerable business is expected to develop to the point of bid-taking early next year. One seller has a total of 50 miles of such work listed. Hammond, Ind., has awarded 40 tons of 6-in. to the National Cast Iron Pipe Co. Denver took bids Dec. 23, on 343 tons of 6, 8, 10 and 12-in. The Michigan Central Railroad received tenders Dec. 23 on one-half mile of 6-in.

We quote per net ton, f.o.b. Chicago, ex-war tax, as follows: Water pipe, 4-in., \$47.10 to \$48.10; 6-in. and above, \$43.10 to \$44.10; class A and gas pipe, \$4 extra.

Structural Material.—A holiday lull has settled over the fabricating market and there is little new business to report. Fabricators look forward hopefully to the new year and in the meantime are taking work at extremely low figures to tide their shops over the slack period. Successful bids recently named are practically on a pre-war basis, \$47.50 per ton delivered having been quoted on one job recently placed and \$64 per ton erected on another. Recent awards include:

Six hundred and seventy-five tons to the Decatur Bridge Co. for a car repair shop to be constructed at McComb, Miss., for the Illinois Central.

Milwaukee Central Continuation School, second unit, 100 tons, to C. Hennecke Co.

Wisconsin State Highway Commission, truss span at Black River Falls, Wis., 300 tons, to Worden-Allen Co.

State of Illinois, cellhouse for Lockport penitentiary, 150 tons, to Worden-Allen Co.

Contracts Pending

Structural steel for new tuberculosis sanatorium at National Soldiers' Home, Milwaukee, 100 tons. Bids being taken by H. Schmitt & Son, Inc., 430-432 Farwell Avenue, Milwaukee, successful bidder at \$1,094,000.

The mill quotation on plain material ranges from 1.60c. to 1.75c., Chicago. Jobbers quote 2.78c. for materials out of warehouse.

Warehouse Prices.—Local jobbers have reduced wire and wire nails in proportion to the mills' price reductions. The new warehouse quotations are shown under the wire products.

Old Material.—Consumptive buying is at a low ebb and prices, although weak, have changed little. The Pullman Co., which started its rolling mill last week after a long period of idleness bought about 2000 tons of No. 1 wrought and other rolling mill grades. One recent sale of 250 tons of No. 1 wrought was made at \$10.25 per net ton, delivered. Railroad offerings include the Burlington, 4000 tons; the Santa Fe, 3500

tons, and the Pennsylvania Northwestern Region, 2500 tons.

We quote delivery in consumers' yards Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	\$16.00 to \$16.50
Relaying rails	23.00 to 27.50
Cast iron car wheels	15.50 to 16.00
Rolled or forged steel car wheels	13.00 to 13.50
Steel rails, rerolling	12.50 to 13.00
Steel rails, less than 3 ft.	12.50 to 13.00
Heavy melting steel	11.00 to 11.50
Frogs, switches and guards cut apart	11.00 to 11.50
Shoveling steel	10.50 to 11.00
Low phos. heavy melting steel	13.50 to 14.00
Drop forge flashings	7.50 to 8.00
Hydraulic compressed sheet	7.50 to 8.00
Axle turnings	8.00 to 8.50

Per Net Ton	
Iron angles and splice bars	14.00 to 14.50
Steel angle bars	10.50 to 11.00
Iron arch bars and transoms	15.00 to 15.50
Iron car axles	19.00 to 19.50
Steel car axles	12.50 to 13.00
No. 1 busheling	8.25 to 8.75
No. 2 busheling	6.00 to 6.50
Cut forge	10.25 to 10.75
Pipes and flues	6.50 to 7.00
No. 1 railroad wrought	10.25 to 10.75
No. 2 railroad wrought	10.00 to 10.50
Steel knuckles and couplers	11.00 to 11.50
Coil springs	12.50 to 13.00
No. 1 machinery cast	12.50 to 13.00
No. 1 railroad cast	12.00 to 12.50
Low phos. punchings	11.00 to 11.50
Locomotive tires, smooth	10.00 to 10.50
Machine shop turnings	3.50 to 4.00
Cast borings	5.50 to 6.00
Stove plate	12.00 to 12.50
Grate bars	10.50 to 11.00
Brake shoes	10.50 to 11.00
Railroad malleable	11.25 to 11.75
Agricultural malleable	11.25 to 11.75

Birmingham

BIRMINGHAM, ALA., Dec. 27.

Pig Iron.—Sales made during week ending on Christmas Eve were on a basis of \$17. At the close of the week this was the admitted maximum. It is understood that one furnace interest had by that time made proffer of its make at around \$16.50. However, the week closed with \$17 the base as a general rule. Business of the week was a surprise to several makers. Radiator works came into the market for 1000 tons, a pipe maker took the same amount and sanitary manufacturing interests, which had already taken 1000 tons, purchased an additional tonnage. One maker booked 1500 tons and another 2500 compared with less than 1000 tons between the two the preceding week. The market is not capable of analysis and is so competitive that no price on a large tonnage would surprise. At the same time, the bookings of the past week have served to considerably stimulate the market and again there is consideration of what the eventual effect will be of the splendid position of the furnaces with regard to stocks. The Sloss-Sheffield Steel & Iron Co. blew in the Hattie Ensley furnace at Sheffield this week after months of total non-production by its furnaces, pending which the company worked off a large stock of pig iron. The Sheffield iron enjoys a differential of 40c. to 80c. over Birmingham in freight to Middle Western points of delivery. Indications point to fully as large melt by Southern foundries following the holidays as that of the fall and winter preceding. The general feeling is rather more optimistic than it has been in some time.

We quote per gross ton f.o.b. Birmingham district furnaces, as follows:

Foundry, silicon 1.75 to 2.25	\$17.00
Basic	16.00
Charcoal, warm blast	35.00

Finishing Mills.—The Tennessee Company and Gulf States Steel Co. are taking the usual holiday of a week and will resume Monday. It develops from port records that the Tennessee company shipped during the year for export about 12,000 tons of rails, plates, structural steel and track accessories monthly. This accounts for the not less than 50 per cent operation of its

finishing mills in 1921. A large portion of the exports moved down the Warrior River in barges to Mobile at a saving of 20 per cent of the all-rail freight rate.

Cast Iron Pipe.—Pipe makers report a very quiet season and will be closed until probably Jan. 15. Sale of municipal bonds in the South is going on in volume and presages a large amount of water main laying. Atlanta will soon be in the market for water mains provided out of a portion of an \$8,000,000 bond issue.

Coal and Coke.—Coke has weakened again and standard foundry is obtainable at \$5.25 to \$5.50 with furnace coke at \$5.

Old Material.—The scrap market is listless and prices tend to sag with the lower base for pig iron. So little is going on, however, that quotations have not been officially changed.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Steel rails	\$11.00 to \$12.00
No. 1 steel	10.00 to 11.00
No. 1 cast	14.00 to 15.00
Car wheels	13.00 to 14.00
Tramcar wheels	12.00 to 13.00
No. 1 wrought	12.00 to 13.00
Stove plate	11.00 to 12.00
Cast iron borings	6.00 to 7.00
Machine shop turnings	6.00 to 7.00

Boston

BOSTON, Dec. 27.

Pig Iron.—No sales of importance are reported this week, business being confined to car lots, of which possibly half a dozen or so changed hands. A textile machinery maker this week is expected to close on 250 tons No. 2 plain, and a like amount of No. 2 X, January delivery, and the Framingham Foundries, Framingham, Mass., on 350 tons, silicon 2.75 to 3.25, and 150 tons, silicon 2.25 to 2.75, first quarter delivery. A Vermont foundry is in the market for 500 tons No. 2 X iron, second quarter delivery, but few furnaces apparently are willing to sell so far ahead. Eastern Pennsylvania furnaces are quoting firmer prices and in some instances making a \$1 differential between No. 2 plain and No. 2 X, and a \$1.50 differential between No. 2 X and No. 1 X. The market for Buffalo iron also is firmer, the available tonnage obtainable for less than \$19.50 having dwindled to small proportions and at least 50c. differentials being insisted upon. Virginia and Alabama irons are still out of range with Buffalo and eastern Pennsylvania, but an occasional car lot is taken for mixture purposes.

We quote delivered at common New England points as follows, having added to furnace prices \$4.06 freight from eastern Pennsylvania, \$5.46 from Buffalo, \$6.58 from Virginia and \$10.66 from Alabama:

East. Penn., silicon 2.25 to 2.75	\$24.56 to \$25.56
East. Penn., silicon 1.75 to 2.25	24.06 to 24.56
Buffalo, silicon 2.25 to 2.75	24.46 to 25.96
Buffalo, silicon 1.75 to 2.25	24.46 to 25.46
Virginia, silicon 2.25 to 2.75	30.08 to 31.08
Virginia, silicon 1.75 to 2.25	29.58 to 30.58
Alabama, silicon 2.25 to 2.75	29.16
Alabama, silicon 1.75 to 2.25	28.66

Finished Iron and Steel.—Mill representatives report little activity in iron and steel, some saying incoming business is back to the June, last, basis. The market on shapes, plates and bars is largely nominal at 1.50c., Pittsburgh. New England rolling mill interests are offered heavy bars at \$19 per gross ton alongside dock, New Jersey. Plates are selling in small lots, but the aggregate tonnage for the week is fairly large. Competition for business among the boiler makers continues keen. A Chicago concern bid \$71,800 on an Arlington, Mass., tank job, involving the destruction of one and erection of another 300-ton plate tank, while a Holyoke, Mass., firm bid \$29,737. These bids represent the two extremes. Stone & Webster, Boston, are asking bids on 800 tons of structural steel for a Western Union building at Philadelphia, and bids will be opened Jan. 12 on 400 tons for a Hudson County, N. J., hospital. A Providence, R. I., fabricator is awarded 300 tons for a local machine shop, and 214

tons for a Brookline, Mass., high school will be awarded this week.

Jobbers now quote: Soft steel bars, \$2.71½ per 100 lb. base; flats, \$3.21½; concrete bars, \$2.20 to \$2.71½; tire steel, \$4 to \$4.40; spring steel, open hearth, \$4.50; crucible, \$11.50; steel bands, \$3.31½ to \$3.78; steel hoops, \$3.31½; toe calk steel, \$5; cold rolled steel, \$3.55 to \$4.05; structural steel, \$2.71½; plates, \$2.81½ to \$2.99; No. 10 blue annealed sheets, \$3.73; No. 28 black sheets, \$4.50; No. 28 galvanized sheets, \$5.50; refined iron, \$2.71½; best refined, \$4.25; Wayne iron, \$5.50; Norway iron, \$5.50 base.

Warehouse Business.—The demand for warehouse products shows a further shrinkage, which is seasonable. Local quotations on cold-rolled steel have been reduced 20c. per 100 lb. to \$3.55 to \$4.05. Wire nails from stock are now \$3.75 per keg base, as against \$4, heretofore. Certain houses are eliminating all extras on horse shoes and offering to break packages, in an effort to reduce stocks. Picks and mattocks have been revised downward 10 per cent.

Old Material.—The old material market during the past week has been practically at a standstill. Even the American Steel & Wire Co., Worcester, Mass., has stopped buying, and purchases of machinery cast by the New England foundries is confined to minimum lots from local scrap dealers. In the absence of trading, prices have had little opportunity to change. Better conditions are anticipated after Jan. 1, when some of the eastern and central Pennsylvania steel mills are expected to enter the market for material.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery cast	\$18.00 to \$19.00
No. 2 machinery cast	16.00 to 17.00
Stove plate	14.50 to 15.00
Railroad malleable	13.50 to 14.00

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	\$7.50 to \$8.00
No. 1 railroad wrought	11.00 to 11.50
No. 1 yard wrought	9.00 to 9.50
Wrought pipe (1 in. in diameter, over 2 ft. long)	7.00 to 7.50
Machine shop turnings	3.50 to 3.75
Cast iron borings, rolling mill	5.75 to 6.50
Cast iron borings, chemical	7.00 to 7.25
Blast furnace borings and turnings	3.50 to 3.75
Forged scrap and bundled skeleton	4.50 to 5.00
Steel car axles and shafting	11.50 to 12.00
Car wheels	11.00 to 11.50
Rerolling rails	10.00 to 10.50

Buffalo

BUFFALO, Dec. 27.

Pig Iron.—The American Radiator Co.'s current requirements are 4000 tons for use at Buffalo plants and all furnaces with one exception are seeking the business. The one producer not interested is producing basic iron and is not in position to consider the order as one of the conditions is that shipping must be completed within three weeks. A falling off in inquiry is likely due to firmness in prices. About 10,000 tons has been sold by one furnace and some unusual tonnages are involved, the entire lot consisting of six sales. The \$20 base price ruled except on one lot of 400 tons of off-grade iron which went at \$19. The \$20 figure prevailed on sales of 2500 tons by another furnace. Some inquiry has appeared for second quarter business, but no quotations have followed. Less than 15,000 tons of new business has been booked and, of course, this is all for first quarter delivery.

We quote f.o.b. per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sil	\$20.00 to \$21.00
No. 2X foundry, 2.25 to 2.75 sil	19.50 to 20.50
No. 2 plain, 1.75 to 2.25 sil	19.00 to 20.00
Basic	20.00 to 21.00
Malleable	20.00 to 21.00
Lake Superior charcoal	31.75

Finished Iron and Steel.—Holiday apathy is showing an effect on sales, but every indication is at hand that business will move briskly after Jan. 1. There is a more determined stand against price concessions and plus assurances that with inventories out of the way, a number of large buyers will come into the market, the entire prospect is very bright. Bars, shapes and plates are uniformly quoted at 1.50c. and but one mill is known to have dropped below this figure on ordinary tonnages, and this interest has quoted 1.40c. on bars, Pittsburgh. The sheet market is firm and an inquiry for 250 tons of black sheets brought out the same quotation from a widely-scattered group of sellers—\$3.

Pipe, which has been in satisfactory demand, is slower and bolt and nut orders have also shown the effect of holiday lack of interest. One order for half a minimum car—12 tons, of bolts and nuts, represents the high point in recent demand for this commodity. The Buffalo Steel Car Co. is operating at full capacity on New York Central and Lackawanna requirements and on Dec. 28 will begin construction of 1000 steel hopper and gondola cars for the Buffalo, Rochester & Pittsburgh Railroad. The Buffalo Structural Co. is fabricating 300 tons of shapes for the Empire State Ice Co., Buffalo. The New York Central Railroad has settled with city authorities the matter of grade crossing elimination at several streets and work involving 2000 tons of shapes will be started soon.

Warehouse Business.—All lines were sluggish but salesmen generally understand a buying movement will begin soon after the holiday season. Wire nails have been reduced \$5 per ton. On the whole, there is more confidence and definite information as to the lifting of several buying embargoes is given.

We quote warehouse prices f.o.b. Buffalo as follows: Structural shapes, 2.80c.; plates, 2.80c.; plates, No. 8 gage, 3.50c.; soft steel bars and shapes, 2.70c.; hoops and bands, 3.30c.; blue annealed sheets, No. 10, 3.55c.; galvanized steel sheets, No. 28, 5.25c.; black sheets, No. 28, 4.25c.; cold-rolled strip steel, 5.90c.; cold-rolled round shafting, 3.80c.

Coke.—About 2000 tons has been sold and some evidences are at hand that a livelier market is in prospect. Prices on best grades range from \$4.25 to \$4.75 ovens.

Old Material.—Production is very light and the slightest interest in any material would likely develop in advance in prices. The same two mills have been buying heavy melting steel but tonnages at \$13.50 are scarce.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel.....	\$13.00 to \$14.00
Low phos., 0.04 and under.....	17.00 to 18.00
No. 1 railroad wrought.....	15.00 to 16.00
Car wheels.....	16.50 to 17.50
Machine shop turnings.....	7.50 to 8.00
Cast iron borings.....	7.00 to 8.00
Heavy axle turnings.....	10.50 to 11.50
Grate bars.....	12.00 to 13.00
No. 1 busheling.....	10.00 to 11.00
Stove plate.....	15.00 to 16.00
Bundled sheet stampings.....	8.00 to 9.00
No. 1 machinery cast.....	17.00 to 18.00
Hydraulic compressed.....	10.50 to 11.50
Railroad malleable.....	13.00 to 14.00

New York

NEW YORK, Dec. 27.

Pig Iron.—Inquiries for 4000 tons heretofore announced are still pending, but no new inquiries of importance have developed. The American Locomotive Co. purchased 800 tons for January delivery and the Essex Foundry 1000 to 2000 tons. An unusual fact at the close of the year is that many foundries, particularly in New England, have not bought a ton of iron the entire year and still have high priced iron on their yards or due on deliveries. Prices are about the same Buffalo merchant furnaces seem to be holding pretty closely to the \$20 base for delivery within the state, but steel companies are credited with shading the market. The company whose Southern iron was reported offered for sale at \$16.50 has made the explanation, telegraphed to this city, that the broker was not authorized to name that low figure.

We quote delivered in the New York district as follows, having added to furnace prices \$2.52 freight from eastern Pennsylvania, \$5.46 from Buffalo and \$6.16 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25.....	\$22.52 to \$23.02
East. Pa. No. 2X fdy., sil. 2.25 to 2.75.....	23.02 to 23.52
East. Pa. No. 2 fdy., sil. 1.75 to 2.25.....	22.52 to 23.02
Buffalo, sil. 1.75 to 2.25.....	24.46 to 24.96
No. 2 Virginia, sil. 1.75 to 2.25.....	27.16 to 28.16

Cast-iron Pipe.—The year will close in contrast to its beginning; then operations were very slight, the most active plants operating at no greater than 25 per cent, while those same plants are now operating at 75 per cent capacity. As many new municipal administrations will be coming into office on Jan. 1, it is expected that many pipe orders will be placed. Much business is in sight for next year, particularly from New England. Judging by recent buying for delivery during the winter months, the consumers of pipe are not expecting any great drop in prices. We quote per

net ton, f.o.b. New York, carload lots, as follows: 6-in. and larger, \$47.30; 4-in. and 5-in., \$52.30; 3-in., \$52.30, with \$4 additional for Class A and gas pipe.

Ferroalloys.—Sales of ferromanganese are confined to carload lots and the inquiries, amounting to about 600 tons, reported as before the market a week ago, have not yet developed into orders. A sale of a carload of British alloy at the full price of \$58.35, seaboard, is noted. Demand for spiegeleisen is also confined to small lots at prevailing quotations and the same is true of 50 per cent ferrosilicon, buying of this material being confined to the immediate needs of consumers who are operating at a much reduced capacity. There is absolutely no interest in high grade manganese ore. Quotations follow:

Ferroalloys

Ferromanganese, domestic, delivered, per ton.....	\$60.00 to \$63.00
Ferromanganese, British, seaboard, per ton.....	\$58.35
Spiegeleisen, 20 per cent, furnace, per ton.....	\$26.00
Ferrosilicon, 50 per cent, delivered, per ton.....	\$55.00 to \$57.00
Ferrotungsten, per lb. of contained metal.....	40c. to 50c.
Ferrochromium, 6 to 8 per cent carbon.....	60
to 70 per cent Cr., per lb. Cr., delivered.....	11c. to 14c.
Ferrovanadium, per lb. of contained vanadium.....	\$4.50

Ores

Manganese ore, foreign, per unit, seaboard.....	20c.
Tungsten ore, per unit, in 60 per cent concentrates.....	\$2.00 up
Chrome ore, 40 to 45 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard.....	\$20.00 to \$25.00
Chrome ore, 45 to 50 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard.....	\$30.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS ₃ , New York.....	45c. to 50c.

Warehouse Business.—The market is extremely quiet and no changes of prices are reported. There is a belief that the new year will mark a certain degree of stiffening in quotations on all materials out of warehouse and slight reductions in a few products. Practically all orders placed with warehouses this week are for delivery next month. We quote prices on page 1710.

High Speed Steel.—The prevailing dullness of this market is accentuated this week by the closeness of the new year. Prices on 18 per cent tungsten high speed steel continue at from 85c. per lb. to 95c. per lb. with special brands bringing up to \$1.05 per lb.

Finished Iron and Steel.—The recent reductions by the Steel Corporation in pipe and in wire products have had the effect of stopping buying rather than anything else. Many consumers approaching the new year with little or no stocks are intimating purchases of such a scale that if half of them do as is expected, the January volume will be encouraging to the mills. As it is, the year closes with structural steel unusually active for the season and continuing business promised in tin plate and pipe. So relatively little has been the buying in December that exporting has been proportionately quite a little larger than domestic business and for this Japanese buying is largely responsible. The Atlantic Refining Co. building, noted three weeks ago as awarded, has definitely been given to the American Bridge Co. Other awards include the Neumont Realty office building, West Forty-fifth Street, 600 tons; the Gunpowder Creek bridge, 500 tons, and to the Hedden Iron Construction Co., an apartment on the southwest corner of Eighty-fifth Street and Broadway, 800 tons. Bids have been taken on 650 tons for new stringers for the Queensboro bridge and bids will be taken this week on 1300 tons for 15 bridges for the Baltimore & Ohio. The Western Union Telegraph Co. is in the market for a 1000-ton building in Philadelphia. The Great Northern is asking for bids on a 200-ft. single track bridge span. Rail orders for 1922 are as yet disappointing. It is understood that the Louisville & Nashville has bought 50,000 tons and that the Carolina, Clinchfield & Ohio is in the market for 5000 tons for the summer of 1922, the Buffalo, Rochester & Pittsburgh for a like tonnage and the Florida East Coast for 7500 tons.

We quote for mill shipments, New York, as follows: Soft steel bars, 1.88c.; plates, 1.83c. to 1.98c.; structural shapes, 1.88c. to 1.98c.; bar iron, 1.98c. to 2.03c. On export shipments the freight rate is now 25.5c. per 100 lb., instead of 38c., the domestic rate.

Old Material.—The buying price of railroad heavy melting steel has been lowered 50c., due to a corresponding drop made by an eastern Pennsylvania steel mill,

which is now offering only \$12. The market is experiencing the usual holiday stagnation. Though one broker has raised buying prices slightly on four items, the general tendency is downward. The trade is still giving thought to the scrapping of war vessels. One proposition suggested is that the principal steel companies in eastern Pennsylvania combine in financing a company for dismantling such ships. A New York broker was offered some foreign steel vessels, but wrote back that we are not yet able to take care of our own war ships.

Buying prices per gross ton, New York, follow:

Heavy melting steel, yard.....	\$7.50 to \$8.50
Steel rails, short lengths, or equivalent	8.50 to 9.00
Rerolling rails	9.50 to 10.00
Relaying rails, nominal.....	28.00 to 30.00
Steel car axles.....	10.00 to 10.50
Iron car axles.....	18.50 to 19.00
No. 1 railroad wrought.....	10.50 to 11.00
Wrought iron track.....	8.25 to 8.75
Forge fire	5.00 to 5.50
No. 1 yard wrought, long.....	9.00 to 9.50
Cast borings (clean).....	6.50 to 7.00
Machine-shop turnings.....	4.00 to 5.00
Mixed borings and turnings.....	4.00 to 4.50
Iron and steel pipe (1 in. diam. not under 2 ft. long).....	6.75 to 7.25
Stove plate	9.00 to 10.00
Locomotive grate bars.....	9.00 to 10.00
Malleable cast (railroad).....	8.00 to 8.50
Car wheels	10.50 to 11.50

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast.....	\$16.50 to \$17.00
No. 1 heavy cast (columns, building materials, etc.), cupola size.....	15.50 to 16.00
No. 1 heavy cast, not cupola size.....	14.00 to 14.50
No. 2 cast (radiators, cast boilers, etc.)	10.00 to 10.50

St. Louis

ST. LOUIS, Dec. 27.

Pig Iron.—The demand for pig iron may be said to be not large enough to establish a market price. Prices are made for each piece of business, and it is a case of barter between buyer and seller. Sales ranged from a carload to 300 tons, a Texas melter buying 100 tons of foundry iron and 200 tons of malleable and 100 tons of foundry iron. Inquiries include several totaling 700 to 800 tons for first quarter shipment, 1000 tons of foundry iron for immediate shipment to a western Missouri melter, and 700 tons for a southern Illinois melter. Inquiries are out for several cars each of ferromanganese and ferrosilicon, and for a carload of spiegeleisen. The eight stove and range interests reporting to the Federal Reserve Bank show declines of from 12 to 31 per cent in November sales as contracted with the same month last year, and losses of from 2 to 16 per cent under October totals.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices \$2.88 freight and war tax from Chicago and \$5.91 from Birmingham:

Northern foundry, sil. 1.75 to 2.25...	\$21.88 to \$22.38
Northern malleable, sil. 1.75 to 2.25...	21.88 to 22.38
Basic	21.88 to 22.38
Southern foundry, sil. 1.75 to 2.25...	22.40 to 23.40

Finished Iron and Steel.—The usual holiday quiet prevails in the markets for finished iron and steel. Jobbers' stocks in this district are reported low, and business from this source is expected after the first of the year. The Missouri Pacific has an inquiry out for two cars of plates and the St. Louis & San Francisco Railroad wants 50 tons of structural bars and plates. Locally there is nothing being done in the building line. The contract for the Medical Arts Building, Dallas, Tex., involving 450 tons of bars has been awarded to George Hewitt, that city. Contracts will be let Jan. 3 for the Auditorium and Market House, Memphis, Tenn., involving 3000 tons of structural steel and 400 tons of bars.

For stock out of warehouse we quote: Soft steel bars, 2.77½¢. per lb.; iron bars, 2.77½¢.; structural shapes, 2.87½¢.; tank plates, 2.87½¢.; No. 10 blue annealed sheets, 3.47½¢.; No. 28 black sheets, cold rolled, one pass, 4.15¢.; cold drawn rounds, shafting and screw stock, 3.65¢.; structural rivets, \$3.52½ per 100 lb.; boiler rivets, \$3.65; tank rivets, 7/16 in. and smaller, 60-10-10 per cent off list; machine bolts, large, 60-10 per cent; small, 60-10 per cent; carriage bolts, large, 55-5 per cent; small, 55 per cent; lag screws, 65-5 per cent; hot pressed nuts, square or hexagon blank, \$4; and tapped, \$3.75 off list.

Coke.—There has been a stronger movement of coke the last week against existing contracts. Miscellaneous orders were placed for carloads to 100 tons of foundry

coke, but no tonnage of consequence was placed. Domestic coke is in heavier demand because of colder weather. The inquiry noted last week for 3000 tons of foundry coke is still open.

Old Material.—Except for a purchase of about 2000 tons of special heavy melting steel by a large consumer, the market for old material has been inactive. Rolling mill grades continue weak. Rerolling steel rails are also off, and are now quoted at \$12 to \$12.50 per gross ton. There is very little trading between dealers, and as the mills will not accept any more material during the remainder of this year, there is nothing to do but mark time, although dealers look for a better market shortly after the turn of the year. Railroad offerings before the market this week are: Atchison, Topeka & Santa Fe, 3700 tons; Pennsylvania, Northwestern Region, 2800 tons.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton

Iron rails	\$15.50 to \$16.00
Steel rails, rerolling.....	12.00 to 12.50
Steel rails, less than 3 ft.....	12.00 to 12.50
Relaying rails, standard section.....	23.00 to 28.00
Cast iron car wheels.....	15.00 to 15.50
No. 1 heavy railroad melting steel.....	11.00 to 11.50
No. 1 heavy shoveling steel.....	10.50 to 11.00
Ordinary shoveling steel.....	10.00 to 10.50
Frogs, switches and guards cut apart.....	11.00 to 11.50
Ordinary bundle sheet.....	4.50 to 5.00

Per Net Ton

Heavy axles and tire turnings.....	\$5.50 to \$6.00
Iron angle bars.....	13.50 to 14.00
Steel angle bars.....	10.00 to 10.50
Iron car axles.....	18.00 to 18.50
Steel car axles.....	13.50 to 14.00
Wrought iron arch bars and transoms.....	13.50 to 14.00
No. 1 railroad wrought.....	9.50 to 10.00
No. 2 railroad wrought.....	8.50 to 9.00
Railroad springs	11.50 to 12.00
Steel couplers and knuckles.....	11.50 to 12.00
Locomotive tire, 42 in. and over, smooth inside	8.50 to 9.00
No. 1 dealers' forge.....	7.50 to 8.00
Cast iron borings.....	6.00 to 6.50
No. 1 bushelings.....	9.00 to 9.50
No. 1 boilers cut in sheets and rings.....	7.50 to 8.00
No. 1 railroad cast.....	13.50 to 14.00
Stove plate and light cast.....	12.00 to 12.50
Railroad malleable	9.50 to 10.00
Agricultural malleable	9.00 to 9.50
Pipes and flues.....	7.50 to 8.00
Heavy railroad sheet and tank.....	6.50 to 7.00
Light railroad sheet.....	4.50 to 5.00
Railroad grate bars.....	9.50 to 10.00
Machine shop turnings.....	5.00 to 5.50
Country mixed iron.....	7.00 to 7.50
Uncut railroad mixed.....	7.50 to 8.00
Horseshoes	10.00 to 10.50
Railroad brake shoes.....	9.50 to 10.00

Cleveland

CLEVELAND, Dec. 27.

Iron Ore.—With the restoration of the higher rail rates on ore from Lake Erie docks to interior furnaces, to become effective Jan. 1, dock shipments continue fairly heavy. These up to Dec. 22 aggregated 544,710 tons, or at the rate of about 700,000 tons for the month. The ore balance on Lake Erie docks and in furnace yards Dec. 1 was 38,300,000 as compared with 41,500,000 tons on the same date a year ago. The amount of lake ore consumed in November was 2,188,000 tons as compared with 1,833,000 tons in October.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, \$6.45; Old range non-Bessemer, 51½ per cent iron, \$5.70; Mesabi Bessemer, 55 per cent iron, \$6.20; Mesabi non-Bessemer, 51½ per cent iron, \$5.55.

Pig Iron.—Sales have kept up to about the recent volume in spite of the holiday period and inquiry is slightly more plentiful, particularly from the East. The market continues weak. While no lower prices are reported than have appeared during the past two weeks, lower quotations on foundry iron seem to have become more general. On this grade there is a spread of from \$19 to \$20 in quotations, depending upon the amount required and whether the inquiry comes from a competitive point having about the same freight rate from two or more furnaces. However, for No. 2 foundry iron \$19.50 seems to have become the more common quotation. One local interest sold over 5000 tons during the week and another lake furnace 2800 tons. One order for 1000 tons was placed by a Pittsburgh district consumer with a Cleveland producer at \$19.50 at a western Pennsylvania furnace. The Cleveland delivery local

furnace prices are unchanged at \$20 to \$20.50 at furnace for No. 2 foundry. Most sales are in small lots for early shipment, but some business has been taken for the first quarter delivery, including a 500-ton lot of foundry iron placed by a Springfield, Ohio, consumer. Two inquiries for malleable iron aggregating 1000 tons have come from Columbus and Indianapolis melters. There is no activity in steel-making iron. The Trumbull-Cliffs Furnace Co., Warren, expects to blow in its stack Jan. 15 and will have some surplus basic iron for the market. Stocks in many furnace yards are low and an improvement in shipment is expected in January.

Quotations below are f.o.b. local furnace for Northern foundry iron, not including a 56c. switching charge. Other quotations are delivered Cleveland, being based on a \$1.96 freight rate from Valley points, a \$3.36 rate from Jackson and a \$6.67 rate from Birmingham:

Basic	\$20.21 to \$20.71
Northern No. 2 fdy., sil. 1.75 to 2.25	19.00 to 20.00
Southern fdy., sil. 2.25 to 2.75	24.67 to 25.17
Ohio silvery, sil. 8 per cent.	32.86
Standard low phos., Valley furnace	34.00

Coke.—Some carlot sales of foundry coke are being made with \$4 to \$4.25 as the more common quotations for the better makes of Connellsville foundry coke.

Finished Iron and Steel.—With the holiday lull, the volume of new orders is very light. However, the leading interest reports that its December business will exceed that of November in this district. Generally prices are holding firm to 1.50c. as a minimum on steel bars, plates and shapes, although an Ohio fabricating shop is understood to have secured a lower price on part of an order for approximately 1750 tons of highway bridge material which was divided between two mills. Small lots of boiler plates are being booked at 1.60c. and on plates lighter than 3-16 in., 1.65c. seems to be the common quotation. Sales of hoops are reported at 1.90c., or \$2 a ton lower than the recent minimum quotation. The purchase of 3000 tons of reinforcing bars for the Baldwin Reservoir of Cleveland has been deferred, as none of the steel will be needed before spring. In structural lines the Fort Pitt Bridge Works has taken the Warranty Secured Discount Co. building, Akron, requiring 1100 tons of structural steel. Lake shipyards are asking for prices on plates and shapes apparently for use in making estimates on the cost of boats with a view of interesting boat operating companies in placing orders. It is believed that the reduced cost of lake freighters will bring out orders for some boats next year. The large number of lake vessels damaged at Buffalo recently will necessitate repair work probably requiring a considerable tonnage of plates.

Jobbers quote steel bars, 2.54c.; plates and structural shapes, 2.64c.; No. 9 galvanized wire, 3.50c.; No. 9 annealed wire, 3.25c.; No. 28 black sheets, 3.75c.; No. 28 galvanized sheets, 4.75c.; No. 10 blue annealed sheets, 3.10c.; hoops and bands, 3.14c.; cold-rolled rounds, 3.85c.; flats, squares and hexagons, 4.35c.

Warehouse Business.—Price concessions are appearing on round lots of steel from warehouse, but prices are well maintained on small orders. The demand is light.

Wire Products.—Independent mills have followed the lead of the American Steel & Wire Co. in reducing prices to 2.50c., Pittsburgh, on nails and 2.25c. on plain wire. Orders will be taken for the first quarter at the new prices, but so far the price reduction has done little to stimulate business. The leading interest has named \$38 as its new price on wire rods.

Sheets.—Some carlot orders are being placed for January shipment, but as a whole the market is dull. Mills are maintaining regular prices, but a Valley district broker is offering black and galvanized sheets at a price concession of \$3 a ton.

Bolts, Nuts and Rivets.—New orders for bolts and nuts are very light. There is some inquiry for rivet contracts for the first quarter, but the leading local maker is declining to make contracts for that delivery until after the first of the year. Prices as low as 2.20c. for structural and 2.30c. for boiler rivets are reported, but small lot sales are being made at regular prices.

Old Material.—A West Virginia mill has placed an order with a local dealer for 500 tons of compressed steel scrap for January delivery at \$11.75 and a Cleve-

land consumer has purchased a small tonnage of heavy melting steel. Outside of these sales, the market was very quiet during the week, but considering the dullness, prices are firm. Shipments have slowed down owing to the holding up of deliveries by mills during the holiday season. In addition to temporary suspensions by other mills reported last week, the Sharon Steel Hoop Co. has held up deliveries. Cast borings and mixed borings and turnings are slightly firmer locally because of some recent Cleveland demand.

We quote per gross ton, f.o.b. Cleveland, as follows:

Heavy melting steel	\$11.50 to \$12.00
Steel rails, under 3 ft.	12.50 to 13.00
Steel rails, rerolling	14.00 to 14.50
Iron rails	12.00 to 12.50
Iron car axles	18.00 to 19.00
Low phosphorus melting	13.00 to 13.50
Cast borings	8.50 to 9.00
Machine shop turnings	7.50 to 7.60
Mixed borings and short turnings	8.50 to 9.00
Compressed steel	8.75 to 9.00
Railroad wrought	12.00 to 12.50
Railroad malleable	12.50 to 13.00
Light bundled sheet stampings	6.00 to 7.00
Steel axle turnings	9.00 to 10.00
No. 1 cast	15.00 to 16.00
No. 1 bushing	8.25 to 8.75
Drop forge flashings, over 10 in.	7.50 to 8.00
Drop forge flashings, under 10 in.	7.50 to 8.00
Railroad grate bars	12.75 to 13.00
Stove plate	13.00 to 13.25
Pipes and flues	8.50 to 9.00

Philadelphia

PHILADELPHIA, Dec. 27.

Pig Iron.—In an otherwise dead market, a flurry in pig iron buying during the past week is outstanding. Competition among furnaces for sufficient business to remain in blast without piling iron brought out such low prices that some buyers decided they could do no better by waiting and a few substantial tonnages were placed, the largest of which was 3000 tons bought by a cast iron pipe company at \$18, furnace, for No. 2 plain. In this instance, however, the furnace company had a freight rate which brought the delivered price to more than \$20, and this is not far out of line with delivered prices which have been made by other furnaces closer by. Most of the week's foundry iron business has been taken at \$19 to \$19.50, furnace, for No. 2 plain and \$20 to \$20.50 for No. 2X. The bulk of the low-priced business was taken by two furnaces, one of which has only recently gone in blast. It booked 9000 tons within 10 days and then advanced its prices to a minimum of \$20 for No. 2 plain and \$20.50 for No. 2X. Other furnaces are also quoting these prices, though some quotations at or around \$19 for No. 2 plain are still outstanding. As the furnaces which have been making the lowest prices are now fairly well filled up for the present, there is a better tone in the market. In the past two weeks fully 50,000 tons of foundry iron has been sold by eastern Pennsylvania furnaces and the total of all grades for three weeks is about 75,000 tons. Some fairly good-sized inquiries are still pending, including one for 2000 tons from the Central Foundry Co. Buyers have become a bit hesitant because of the weakness in prices and on this account there has been delay in closing certain business for first quarter. An Eastern steel company last week bought 2000 tons of basic at \$20.25, making a total of 8000 tons contracted for by this company within two weeks, delivered prices being identical, though three furnaces divided the business. Makers of low phosphorus iron have reduced prices in an effort to stimulate buying, copper free iron now being quoted at \$30, furnace, and copper bearing iron at \$28, furnace. Other grades are inactive and prices are nominal. The Brooke furnace was blown in to-day.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 84 cents to \$1.54 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	\$20.34 to \$21.26
East. Pa. No. 2X, 2.25 to 2.75 sil.	21.34 to 21.76
Virginia No. 2 plain, 1.75 to 2.25 sil.	27.74 to 28.74
Virginia No. 2X, 2.25 to 2.75 sil.	28.24 to 29.74
Basic deliv. eastern Pa.	20.25
Gray forge	21.00 to 22.00
Malleable	22.00 to 24.00
Standard low phos. (f.o.b. furnace)	30.00
Copper bearing low phos. (f.o.b. furnace)	28.00

Ferroalloys.—There is very little business and no changes in prices of ferromanganese or spiegeleisen. The former is quoted by Eastern makers at \$58.35, seaboard, which is also the British price, and spiegeleisen is quoted from \$25 to \$27, furnace.

Coke.—Foundry coke is obtainable at \$4, Connells-ville, and furnace coke from \$3.10 to \$3.25 on contract, with distress coke offered at lower prices.

Billets.—Open-hearth re-rolling billets have sold at \$28 and forging billets at \$32, Pittsburgh. There is very little demand.

Finished Steel.—Consumers and jobbers have been buying very sparingly in the past week. Some steel companies' local sales offices have taken almost no business worth mentioning. Prices nominally remain unchanged, 1.50c., Pittsburgh, for plates, shapes and bars, but as has been usual for several months, concessions are made on desirable business. On a round lot of plates, shapes and bars for an Ohio fabricator an Eastern steel company quoted 1.425c., Pittsburgh, and got part of the business at this price. One order for a few hundred tons of sheets for car work stands out as exceptional in the quietness of the steel market. An inquiry for 1200 tons of shapes for the proposed new Western Union Building is in the market.

Bar Iron.—Not enough business in bar iron has been done to test the current price of 1.50c., Pittsburgh, which is quoted by most of the Eastern mills.

Warehouse Business.—There have been no changes in prices on steel out of stock in the past week. Quotations for Philadelphia delivery are as follows:

Soft steel bars and small shapes, 2.65c.; iron bars (except bands), 2.65c.; round edge iron, 2.80c.; round edge steel, iron finish, 1½ x ½ in., 2.95c.; round edge steel planished, 3.70c.; tank steel plates, ¼-in. and heavier, 2.75c.; tank steel plates, 3/16-in., 2.925c.; blue annealed steel sheets, No. 10 gage, 3.50c.; light black sheets, No. 28 gage, 4c.; galvanized sheets, No. 28 gage, 5c.; square twisted and deformed steel bars, 2.65c.; structural shapes, 2.60c.; diamond pattern plates, ¼-in., 4.60c.; 3/16-in., 4.785c.; ¼-in., 4.90c.; spring steel, 4.10c.; round cold-rolled steel, 3.25c.; squares and hexagons, cold-rolled steel, 3.75c.; steel hoops, No. 13 gage and lighter, 3.50c.; steel bands, No. 12 gage to 3/16-in., inclusive, 3.25c.; iron bands, 3.90c.; rails, 2.75c.; tool steel, 8c.; Norway iron, 5c.; toe steel, 4.50c.

Old Material.—Demand for scrap has fallen away almost to nothing. Prices are unchanged. The following quotations stand, in the absence of transactions, as nominally the market on the various grades for delivery at consumers' works in this district:

No. 1 heavy melting steel.....	\$11.50 to \$12.50
Scrap rail	11.50 to 12.50
Steel rails, re-rolling.....	16.25 to 16.75
No. 1 low phos., heavy 0.04 and under	17.00 to 18.00
Car wheels	16.50 to 17.00
No. 1 railroad wrought.....	14.50 to 15.00
No. 1 yard wrought.....	12.00 to 12.50
No. 1 forge fire.....	9.50 to 10.00
Bundled sheets (for steel works)....	9.50 to 10.00
No. 1 busheling.....	12.00 to 13.00
No. 2 busheling.....	10.00 to 11.00
Turnings (short shoveling grade for blast furnace use).....	9.00 to 9.50
Mixed borings and turnings (for blast furnace use).....	9.00 to 9.50
Machine-shop turnings (for rolling mill and steel works use).....	9.00 to 9.50
Heavy axle turnings (or equivalent)	9.50 to 10.00
Cast borings (for steel works and rolling mills)	11.50 to 12.00
Cast borings (for chemical plants)...	13.50 to 14.00
No. 1 cast.....	16.50 to 17.00
Railroad grate bars.....	14.00 to 14.50
Stove plate (for steel plant use)....	14.00 to 14.50
Railroad malleable	13.50 to 14.00
Wrought iron and soft steel pipes and tubes (new specifications).....	11.50 to 12.00
Iron car axles.....	No market
Steel car axles.....	17.00 to 18.00

The Gehl Brothers Mfg. Co., West Bend, Wis., manufacturer of farm operating equipment, and conducting a foundry and machine shop business, has increased its capital stock from \$200,000 to \$350,000, of which \$250,000 is common and \$100,000 preferred stock. The new issue will be employed in the development of the business. No immediate enlargement of plant and equipment is contemplated.

Ralph A. Kellogg, secretary of the Lackawanna Bridge Co. and the Ferguson Steel & Iron Corporation, Buffalo, has called a special meeting of stockholders on Jan. 3, at the company's offices, 536 Ellicott Square, for approval of the proposed sale of both properties to the Lackawanna Steel Co., Buffalo.

Cincinnati

CINCINNATI, Dec. 27.

Pig Iron.—As was expected, the holiday week in the market was a quiet one. There were, however, occasional carload sales made, and in one case 500 tons of Southern iron was bought by an Ohio melter. This was the only sale of consequence in the Cincinnati district. Radiator interests are reported to have booked considerable tonnages of iron for first quarter delivery, the iron coming from Buffalo, Valley and Birmingham districts, and it is reported that the price on the Northern iron was \$19, furnace, while that on Southern was \$17. There is very little inquiry. An Indianapolis melter is in the market for 300 tons of malleable, a northern Ohio melter for 300 tons of foundry, and an Indiana melter for 100 tons of low phosphorus. A Cleveland district melter is inquiring for 1000 tons of Bessemer iron. An Illinois car wheel manufacturer is inquiring for 250 tons of high silicon iron and 200 tons of ferromanganese for shipment to its Michigan plant. There have been no price changes reported, Southern iron being quoted at \$17, Birmingham and Northern at \$19.50 to \$20. The trade is rather expectant of some business developing during the month of January, and is very much encouraged over the prospects. Sarah Furnace of the Kelly Nail & Iron Co. in southern Ohio will blow in Jan. 1, while Jisco Furnace in Jackson County will go out during the present week. It is expected that the Portsmouth stack will be lighted soon after New Year's.

Based on freight rates of \$4.50 from Birmingham and \$2.52 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	\$21.50
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	22.00
Ohio silvery, 8 per cent sil.....	30.02
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	\$22.02 to 22.52
Basic, Northern	22.02
Malleable	22.52

Finished Material.—The market is passing through the customary quietness of the holiday period, and very few orders are being placed. Orders for wire products for delivery during the first quarter have been booked on the basis of the new prices quoted by the American Steel & Wire Co., effective Dec. 21. This new schedule makes the price of common wire nails \$2.50 per keg base, Pittsburgh, and plain wire \$2.25 per 100 lb., Pittsburgh. Corresponding reductions have been made on other wire products. An independent company reports receipt of an order for 300 tons of structural steel from a central Ohio fabricator. This business was placed on the basis of 1.50c., Pittsburgh. A number of inquiries for reinforcing bars are also before the trade. Prices on the heavier steel products show very little change, the usual quotations on bars, shapes and plates being 1.50c., Pittsburgh. In sheets there is very little inquiry and the prices are holding firmly at 3c. for black and 4c. for galvanized. Some activity is apparent in the structural field. The largest project up for bids is a warehouse for the Belknap Hardware Co. at Louisville, Ky. This will take 2200 tons of reinforcing bars and 3000 tons of structural steel. Bids will close on Dec. 29. Bids are also in for a Shriner's Temple at Charleston, W. Va., taking 600 tons. The Elks Temple, Cincinnati, taking 300 tons, will likely be awarded this week. An hotel in Johnston City, Tenn., taking 550 tons, will be up again shortly, as some revision has been made in the plans. Pending projects include an office building at Memphis, Tenn., 600 tons, and the Catholic Club at Memphis, Tenn., 900 tons. These are expected to come up shortly after the first of the year. Lettings include 300 tons to the Belfontaine Bridge Co. for an erecting shop for the Illinois Car Co. at Urbana, Ohio, and a hotel at Frankfort, Ky., 250 tons, to a Louisville fabricator.

Coke.—There is very little activity in the coke market. A southern Ohio furnace has closed on 2500 tons of furnace coke per month, for three months, at a reported price of \$4.50, West Virginia ovens. A central Ohio melter also purchased 300 tons of foundry coke for February shipment. With these exceptions, sales are confined to carloads. There is practically no inquiry.

Warehouse Business.—Warehouse business is very quiet, due no doubt, to the holiday period. In view of the depleted condition of stocks, however, it is expected that much improvement will be shown after the first of the year. Prices are unchanged.

Iron and steel bars, 2.90c. base; hoops and bands, 3.50c. base; shapes and plates, 3c. base; reinforcing bars, 2.97½c. base; cold rolled rounds, 1½-in. and larger, 3.70c.; under 1½-in. and flats, squares and hexagons, 4.20c.; No. 10 blue annealed sheets, 3.60c.; No. 28 black sheets, 4.25c.; No. 28 galvanized sheets, 5.25c.; wire nails, \$3.25 per keg base; No. 9 annealed wire, \$3 per 100 lb.

Old Material.—Dealers report business as still stagnant. It is reported that a Valley consumer bought in the neighborhood of 2000 tons of heavy melting steel, at an unnamed price. Locally the market is very quiet, but prospects for the future are brighter, in the opinion of local dealers. Prices are unchanged.

We quote dealers' buying prices, f.o.b. cars:

Per Gross Ton	
Bundled sheets	\$3.50 to \$4.00
Iron rails	12.00 to 12.50
Relaying rails, 50 lb. and up	25.00 to 26.00
Re-rolling steel rails	10.50 to 11.00
Heavy melting steel	9.00 to 9.50
Steel rails for melting	9.00 to 9.50
Car wheels	12.00 to 13.00
Per Net Ton	
No. 1 railroad wrought	8.50 to 9.50
Cast borings	3.00 to 3.50
Steel turnings	2.00 to 2.50
Railroad cast	12.00 to 12.50
No. 1 machinery	13.50 to 14.50
Burnt scrap	7.50 to 8.00
Iron axles	15.50 to 16.50
Locomotive tires (smooth inside)	9.50 to 10.00
Pipes and flues	4.00 to 4.50

Belgium Feeling British Competition

BRUSSELS, BELGIUM, Dec. 8.—The dullness in the Belgian iron and steel market continues, although there is some exporting to neighboring markets. Belgian bars are being consumed in fair quantities by the United Kingdom manufacturers of screws and bolts, and there is a more pronounced demand from English shipyards for iron of the quality used in making chains. Of late there has been a slight diminishing in the exports of Belgian and French irons to England, Cleveland makers having reduced quotations by about 10s.

With the approach of Christmas a heavy influx of cutlery and other metal utensils from Sheffield, England, has been noted to the detriment of the domestic product. Spanish speaking markets and the British colonies have inquired for, and purchased, sheet copper products, valves, filters, water meters, pressure and steam gages, small metal specialties of German and Austrian manufacture have almost completely displaced the British products in Belgium and in England. The British Board of Trade is considering protests of English manufacturers, who claim that this influx of Continental products constitutes dumping.

The strong effort of British rolling mills for export business is beginning to be felt by the Belgian export trade, which considered that it had gained a permanent and fairly secure foothold in many foreign markets. Much capital seems to be made by British sellers of the unsettled and disorganized conditions of Continental sellers and the consequent uncertainty of deliveries in view of strikes and other obstacles. The situation among Belgian rolling mills is not of the best, but one of the principal reasons has probably been the extremely independent attitude of many mills toward rolling any but specification material, which they consider sufficiently remunerative. The recent increase of 2s. to 5s. per ton on semi-finished material has resulted in the almost complete stoppage of English orders.

Among recent export contracts of size is about 5000 tons of rails sold to Japan at about \$45 per ton, c.i.f. port. Belgian foundry iron has been offered at \$25 per ton on the Pacific Coast of the United States.

It is announced from Wabash, Ind., that the Service Motor Truck Co. of that city has completed negotiations with the Polish Government for 1300 trucks, parts and tires, representing a value of \$3,500,000, the first shipment of which has gone forward.

British Iron and Steel Market

Holiday Season Has Curtailed Business—Galvanized Sheets Weak—Railroad Rate Reductions Less Than Expected

(By Cable)

LONDON, ENGLAND, Dec. 24.

As there is a holiday until Wednesday (Dec. 28) most works are closing until after the new year begins. Railroad rates for raw materials and certain classes of manufactured iron and steel have been reduced 25 per cent. Traders, however, are not over hopeful, as a greater reduction had been anticipated.

There is more inquiry for Cleveland pig iron, but little business. Steel rails have been reduced 20s. (\$4.20) for home buyers. There is more business moving, but not enough to keep the works employed.

German merchant bars have been sold to India at £8 7½s. (1.57c. per lb.) c.i.f. China bought merchant bars at £9 15s. (1.83c. per lb.) c.i.f., but is now offering £9 5s. to £9 7½s. (1.73 to 1.76c. per lb.) c.i.f.

German structural steel (beams) is being sold at £7 10s. (1.41c. per lb.) f.o.b., for January shipment. Belgian angles are quoted at £7 10s. to £7 15s. (1.41 to 1.45c. per lb.) f.o.b., for first half of January. German wire rods are being sold at £8 10s. (\$35.70) f.o.b. for first quarter shipment.

Tin plates are weaker on the continuance of forced liquidation. Prompt 28 x 20's have sold at 40s. (\$8.40) f.o.b. for December delivery. For far forward shipment, sales are done at less. Export demand has decreased. Home trade is buying odd sizes at 20s. (\$4.20) basis for January delivery.

India has bought fair lines of 24-gage galvanized sheets at £16 12½s. and £16 10s. (3.12c. and 3.09c. per lb.) f.o.b. for January delivery. The market is weak.

We quote gross ton, except where otherwise stated, f.o.b. maker's works, with American equivalent figured at \$4.20 per £1 as follows:

Durham coke, delivered	£1 8½ to £1 10	\$5.98 to \$6.30
Cleveland No. 1 foundry	5 5 to 5 10*	22.05 to 23.10*
Cleveland No. 3 foundry	5 0 to 5 5*	21.00 to 22.05*
Cleveland No. 4 foundry	4 15	19.95
Cleveland No. 4 forge	4 10	18.90
Hematite	7 0*	29.40*
East Coast mixed	5 0 to 5 2½*	21.00 to 21.52*
Ferromanganese	15 0 to 14 10*	63.00 to 60.90*
Rails, 60 lb. and up	8 10 to 9 10	35.70 to 39.90
Billets	8 0 to 8 5	33.60 to 34.65
Sheet and tin plate bars, Welsh	7 15	32.55
Tin plate, base box	0 19½ to 1 0*	4.15 to 4.26
C. per Lb.		
Ship plates	9 10 to 10 10	1.78 to 1.97
Boiler plates	14 0 to 14 10	2.62 to 2.72
Tees	10 0 to 11 0	1.87 to 2.06
Channels	9 5 to 10 15	1.73 to 2.02
Beams	8 0 to 10 0	1.50 to 1.81
Round bars, ¾ to 3 in.	10 5 to 10 10	1.92 to 1.97
Galvanized sheets, 24 g.	15 10 to 17 0	3.09 to 3.19
Black sheets	14 0	2.62
Steel hoops	12 0 to 12 5*	2.25 to 2.30*
Cold rolled steel strip, 20 g.	24 10	4.59

*Export price.

Continental Competition in Pig Iron and Steel Rapidly Diminishing—Sentiment Better

LONDON, ENGLAND, Dec. 14.—The improvement in trade conditions, which has been eagerly looked for so long, has only made its appearance in a few branches of the iron and steel industry, such as the galvanized sheet and tin plate trades, though generally speaking all improvement is very gradual. However, sentiment is considerably better, based on settlement of the Irish question, the favorable progress which is being made at the Washington conference and the talk of some new conditions being arrived at in respect of payment of reparations by Germany. These factors, together with the fact that labor has more or less settled down, gives a generally more hopeful feeling. At the time of writing no strikes are threatened, though wages are being cut.

Business in pig iron does not expand. Makers keep cutting prices but buyers are shy at placing or-

ders for anything like substantial quantities while the uncertainty of values lasts and while there are reasonable hopes of railroad rates being considerably reduced. No. 3 Cleveland iron at 100s. per ton, delivered consumers' works, easily competes with Continental pig iron, and supplies of that material coming to this country are diminishing, especially as Continental prices have been raised, owing to shortage of fuel there. During the week two Cleveland furnaces, which were producing basic pig iron, have been transferred to foundry iron, making five furnaces producing the latter. The hematite market is weak. There is some scattered demand, but it is insufficient to absorb production, especially as four more furnaces have recently been started. Rather than put this iron into stock, makers are cutting prices. East Coast mixed numbers are now worth not more than about 102s. 6d.

Foreign ore is to all intents and purposes a dead market. Here and there one hears of small cargoes changing hands, but the Spanish mine owners are not at all inclined to reduce their selling prices. Best Bilbao rubio is nominally about 26s. to 27s., ex-ship Tees.

In finished and semi-finished iron and steel, Continental competition is out of the running for semi-finished material, but in finished steel competition from that source is still an important factor. Makers here, however, are, as far as they are able, taking steps to secure orders and very low figures are heard of in connection with special sales for export. How long they hope to be able to do so is uncertain, as selling at these figures entails considerable loss, and while some makers are adopting this policy, others would sooner curtail or cease production. Of course, if railroad rates came down, as indeed it is hoped they will, steel makers would have a chance to secure orders, but the general demand at the present time is totally inadequate.

Swan, Hunter & Wigham Richardson, Ltd., has secured contracts for two small vessels for use on Canadian lakes. The order is not an important one in respect of size, but it is distinctly encouraging.

Experimental Work of the Bureau of Mines

At the experiment station of the Bureau of Mines at Seattle, Wash., further studies of the carburization of iron have been made in connection with the production of synthetic gray iron from scrap steel or from sponge iron. This study includes the introduction of carbon in presence of varying amounts of silicon, manganese, sulphur, etc. New and interesting results bearing upon the carburization of iron are being obtained.

In a general study of drill steel problems, being conducted at the Mississippi Valley station of the bureau, a report on the results of rock drill tests in the Missouri-Kansas-Oklahoma zinc district has been completed. Another phase of the drill steel problem, to determine the best composition of a straight carbon steel for drilling in granite, has been assigned to two "fellows" in the Missouri School of Mines, with Prof. C. R. Forbes and C. Y. Clayton acting in an advisory capacity. Plans and specifications are being drawn for constructing an oil-fired furnace to heat drill steels.

Work formerly done at the Berkeley, Cal., station of the bureau on the reduction of iron oxides with various reducing gases (producer gas, oil gas, etc.), showed that methane probably does not function actively in the reduction of iron oxides at temperatures up to 1470 deg. Fahr. To check up this point and to find out at just what temperature it does begin to function actively, work is being done on the preparation of pure methane and its application to various oxides of iron.

In connection with the general study of Neumann bands in steel, being conducted at the station of the bureau at Minneapolis, Minn., a special study has been made of the results obtained in subjecting mild steel disks to sudden distortion by means of explosions of various velocities.

In the course of the experiments regarding the reduction of iron oxide, 75 experiments were recently performed at the Minneapolis station of the bureau on

the resistance encountered by a stream of air in passing through a bed of ore and of coke. Fifty additional experiments on the transfer of heat from a gas to a solid were carried out, for the case of air passing through a bed of lead shot. These experiments on the resistance of gases, and the transfer of heat, constitute data necessary to the design of the experiments on the reduction of ore by gases, and are a particularly essential pre-requisite to any attempt at an engineering application of the results.

Investigations at the Pittsburgh experiment station of the bureau on the technology of aluminum, include studies of causes for and prevention of cracks in aluminum-alloy castings; disintegration of aluminum-manganese alloys; analysis of aluminum and aluminum alloys; the contraction and shrinkage of aluminum alloys; and the effect of remelting aluminum alloys.

BRAZIL BUYS MACHINERY

Excavating Machinery Will Be Supplied for Rio de Janeiro Contract—Japan Closing on Heavy Rail Tonnage

NEW YORK, Dec. 27.—There is but little change in the export situation as the year ends. Japanese buying continues at about the same level and Japanese export houses report numerous orders, principally for sheets, booked with American mills for delivery, c.i.f., Japanese ports, during the first quarter of 1922. Government purchasing of railroad material as well as private purchases is continuing up until the last days of the year. The Imperial Government Railways in Japan will decide this week upon the purchase of 13,000 tons of 60-lb. and 75-lb. rails and the Hanshin Electric Railways will close before Jan. 1 on 3500 tons of 100-lb. rails. Rails purchases in the United States by the Government railroads in Japan during the past year are estimated to have been in the neighborhood of 50,000 to 60,000 tons total.

Other foreign markets are generally quiet, although oil and other developments in South America have resulted in some inquiry from South American markets. Besides the development of the oil fields of the Comodoro Rivadavia in Argentina, discovery of some oil in the province of Antofagasta, Chile, has resulted in the formation of the Comunidad de Petroleos de Antofagasta. Oil fields in Santa Cruz, Bolivia, will probably be exploited by an American company formed for the purpose, according to the Bureau of Foreign and Domestic Commerce.

The Austin Machinery Corporation, 30 Church Street, New York, will supply the total equipment used in the removal of a hill in the city of Rio de Janeiro, Brazil. The work, which will be performed by Kennedy, Leonard & Co., New York, involves the removal of a hill in the city, covering about 145,000 square meters. The equipment used will total about \$12,000,000 and includes coal handling machinery, steam shovels, excavators, concrete mixers, trenching machinery, back fillers, cranes and gasoline locomotives. The Austin corporation recently booked an order for \$145,000 worth of road-making machinery for the city of Mexico, which included a tonnage of narrow gage track and six steam shovels.

In connection with the electrification of the Chilean State Railroad, operated by the Government of Chile, Santiago, Chile, the contract for which has been awarded to the Westinghouse Electric & Mfg. Co., 165 Broadway, New York, five electric power houses will be constructed for power supply, with estimated capacity of about 60,000, and feeder and operating lines for a distance of over 230 miles. The entire project is estimated to cost about \$6,500,000, and will require close to 24 months to bring to completion. The line will operate between Santiago, Valparaiso, Linares and Los Andes. A total of 59 electric locomotives will be provided, averaging from 39 to 112 tons each.

NOTHING IS SETTLED

Such Is the Opinion of the Attorney for the National Lumber Manufacturers' Association as to Recent Decision

L. C. Boyle, counsel for the National Lumber Manufacturers' Association, has made an extended statement in regard to the recent decision of the Supreme Court of the United States in what is known as the Hardwood Lumber case, in which the majority opinion was delivered by Justice Clarke, with Justices Brandeis, Holmes and McKenna dissenting. Mr. Boyle's statement in part was as follows:

"The majority opinion adopts the theory as outlined by the Government in its briefs. It would be an idle thing for me at this time to quarrel with the opinion. That the majority of the court has reached an erroneous conclusion is to me manifest. In the nature of things that would be my natural reaction. The great and disappointing thing to me, however, is that the decision does not settle anything. It is true the court holds that this group of hardwood lumber manufacturers were in a conspiracy to restrain trade. However, no yardstick is laid down whereby other groups may find guidance. The great and outstanding thing that we urged the court to decide, to wit, Would it be lawful to gather and distribute statistics covering records of past sales, stocks on hand and production? is left in a confused and doubtful position. In a word, the court assembles all of the activities in which our group indulges, to wit, the publication of the market letter, the distribution of the questionnaire, the collection of sales and stock data, the holding of monthly meetings, and holds that these things comprehend the conspiracy; whereas it was our earnest appeal to the court to indicate what would be legal touching any of these activities as distinguished from what might be illegal as to any of them.

The Vital Element

"There is language in the decision that would indicate that our conduct might have been held legal had we not indulged in certain activities. In other words, if all we did was to collect statistics and distribute the same, such course might not have been held illegal. However, this vital element is left undecided and uncertain.

"There still remains an opportunity to have this question further considered by the Supreme Court. The rules of the court permit the filing of a petition for a rehearing during the term in which a decision is handed down; therefore, we will have opportunity to challenge to the court's attention matters of fact and law wherein it will be pointed out the opinion is in error.

"It may be of interest to here and in a very brief way call attention to certain of these items; it will be noted that the opinion adopts the Government's charge that the plan was designated to and did achieve curtailment of production, whereas counsel representing the Government in the first oral argument frankly admitted to the court that there was no evidence in support of the charge of curtailment and in the Government's original brief this phase of the Government's charge is formally abandoned. Of course, the Government was driven to this position due to the unquestioned state of the record. Nevertheless, the court's opinion is largely devoted to this curtailment phase and the conclusion is definitely asserted that as a part of the conspiracy curtailment of production was involved.

May Grant Rehearing

"I cannot help but feel that when the court's attention is definitely called to its error of conclusion as to this all-important item the petition to rehear will be granted. Again, the Government in its original oral argument formally admitted that it would not be illegal for a group of operators to gather and disseminate

statistical information when the same was done solely for informative purposes. Due to this admission, Mr. Todd and myself were justified in concluding that the court would at least recognize our right to gather and disseminate statistics when same was not done as a means for carrying out some kind of an illegal compact. However, as the court's opinion stands it is difficult to determine whether we would be permitted to do this thing and if it be the law that this would be permitted then the injunction of the lower court should be modified, whereas the lower court's injunction is sustained in all respects.

"One reading this opinion, and who is a stranger to the record would unquestionably get impressions that are not justified by the record itself, and it is just possible that the true state of this record has escaped the Court. To illustrate: In outlining the activities of the Association the Court reviewed the various items as stated in the paper plan as originally conceived. But the opinion does not in any place call attention to the fact that many of these activities were never put in play. For instance, the original plan provided for a daily shipping report; also for the exchange of price lists; also inspection reports. Now, none of these activities were ever indulged, and yet one who reads this opinion and who is not familiar with the facts would get the impression that these matters were involved in the working out of this claimed conspiracy.

Group Meetings

"Again, there were group meetings held throughout the territory wherein the members of the plan had their operations. In reading the opinion one would get the impression that all the members of the plan had gathered in group meetings once a week, or in other words, that the plan was so adjusted that there were constant elbow touch between all the co-operators, whereas the truth is, and concerning which there is no dispute, that during the whole life of the plan the 300 odd members never did meet in one meeting. These group meetings were held in the various territories for the convenience of the members. Those who lived close to one meeting place attended that meeting and not the others, and less than 50 per cent of the members attended any group meeting. However, one reading this opinion would get an entirely different understanding of this phase. It is possible that the Court itself has been misled.

"It may be recalled that in my oral argument I definitely stated that there were two items in which we were vitally concerned, to wit: the sale and stock reports. I urged the Court that if in its judgment it was illegal for an Association to send out market letters that sought to interpret statistics, would it be legal to gather and disseminate statistics without market letters or any comment? I conceived that this was a practical suggestion and as a lawyer I know I was entirely within my province in making same. Unfortunately, however, the Court does not directly and definitely decide the matter. In other words, it is difficult to determine, in the light of this decision, what the Court's opinion would be if there was nothing involved but the gathering and assembling of statistics covering past transactions. This was indeed the very heart of our law suit. The market letters, the questionnaire, the group meetings were but casual and of no moment.

Definite Guidance Lacking

"It is indeed unfortunate that the court did not give definite guidance so that those industries that have no common markets would know the legal limitations, because if the court did hold that under no circumstance could industry keep itself informed by means of associated effort, then Congress would have to relieve the situation.

"The problem will be carefully reviewed in our application for a rehearing and the members can depend upon it that all will be done that is possible. You can well understand that this opinion came as a distinct shock to me. The more I read the opinion the greater is my disappointment."

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight Rates

Freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic...	\$0.35	Kansas City	\$0.815
Philadelphia, export...	0.265	Kansas City (pipe)...	0.77
Baltimore, domestic...	0.335	St. Paul	0.665
Baltimore, export	0.255	Omaha	0.815
New York, domestic...	0.38	Omaha (pipe)	0.77
New York, export.....	0.285	Denver	1.35
Boston, domestic	0.415	Denver (wire products) 1.415	
Boston, export	0.285	Pacific Coast	1.665
Buffalo	0.295	Pacific Coast, ship plates 1.385	
Cleveland	0.24	Birmingham	0.765
Detroit	0.325	Jacksonville, all rail..	0.555
Cincinnati	0.325	Jacksonville, rail and	
Indianapolis	0.345	water	0.46
Chicago	0.38	New Orleans	0.515
St. Louis	0.475		

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 55c.; ship plates, 75c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 75c.; sheets and tin plates, 60c. to 75c.; rods, wire rope, cable and strands, \$1; wire fencing, netting and stretcher, 75c.; pipe, not over 8 in. in diameter, 75c.; over 8 in. in diameter, 2 1/2c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, 1/4 in. thick and over, and zees, structural sizes, 1.50c. to 1.60c.

Sheared plates, 1/4 in. and heavier, tank quality, 1.50c. to 1.60c.

Wire Products

Wire nails, \$2.50 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of \$1.25 and shorter than 1 in., \$1.75; bright Bessemer and basic wire, \$2.25 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$2.25; galvanized wire, \$2.75; galvanized barbed wire, \$3.15; galvanized fence staples, \$3.15; painted barbed wire, \$2.65; polished fence staples, \$2.65; cement-coated nails, per count keg, \$2.00 to \$2.10; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 68 to 70 1/2 per cent off list for carload lots; 67 to 69 1/2 per cent for 1000-rod lots, and 66 to 68 1/2 per cent for small lots, f.o.b. Pittsburgh.

Bolts and Nuts

Machine bolts, small, rolled threads, 70, 10 and 5 to 70, 10 and 7 1/2 per cent off list
Machine bolts, small, cut threads, 70 and 5 to 70 and 10 per cent off list
Machine bolts, larger and longer, 65, 10 and 5 to 70 and 10 per cent off list
Carriage bolts, 1/2 in. x 6 in.:
Smaller and shorter rolled threads,

65, 10 and 10 per cent off list
Cut threads 65 and 10 to 70 per cent off list || Longer and larger sizes..... | 65 and 10 to 70 per cent off list |
Lag bolts	70 and 10 to 70, 10 and 5 per cent off list
Plow bolts, Nos. 1, 2 and 3 heads.....	60 and 10 per cent off list
Other style heads.....	20 per cent extra

Machine bolts, c.p.c. and t. nuts, 1/2 in. x 4 in.:
Smaller and shorter..... 65 and 5 per cent off list || Larger and longer sizes..... | 65 per cent off list |
Hot pressed sq. or hex. blank nuts.....	\$5.50 off list
Hot pressed nuts, tapped.....	\$5.00 to \$5.25 off list
C.p.c. and t. sq. or hex. blank nuts.....	\$5.25 off list
C.p.c. and t. sq. or hex. blank nuts, tapped.....	\$5.00 off list

Semi-finished hex. nuts:
1/4 in. to 9/16 in. inclusive..... 80, 10 and 10 per cent off list || Small sizes S. A. E..... | 80, 10, 10 and 10 per cent off list |
1/2 in. to 1 in. inclusive, U. S. S. and S. A. E.	
70, 10, 10 and 10 per cent off list	
Stove bolts in packages.....	80, 10 and 5 per cent off list
Stove bolts in bulk.....	80, 10 and 7 1/2 per cent off list
Tire bolts	65, 10 and 10 per cent off list
Track bolts, carloads.....	3.25c. to 3.50c. base
Track bolts, less than carloads.....	4.25c. to 4.50c.

Upset Square and Hex. Head Cap Screws

1/2 in. and under..... 80 and 10 per cent off list || 9/16 in. to 1 in. inclusive..... | 80 and 10 per cent off list |

Upset Set Screws

1/2 in. and under..... 80, 10 and 5 to 85 per cent off list || 9/16 in. to 1 in. inclusive..... | 80, 10 and 5 to 85 per cent off list |

Milled Square and Hex. Cap Screws

All sizes 75 and 10 per cent off list |

Milled Set Screws

All sizes 70, 10 and 10 per cent off list |

Rivets

Large structural and ship rivets.....\$2.25 to \$2.40 base
Large boiler rivets.....2.35 to 2.50 base
Small rivets70, 10 and 5 to 70, 10 and 10 per cent off list

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$38; chain rods, \$38; screw stock rods, \$43; rivet and bolt rods and other rods of that character, \$38; high carbon rods, \$45 to \$50, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 9/16-in. and larger, \$2.25 base per 100 lb. in lots of 200 kegs of 200 lb. each or more; spikes, 1/2-in., 3/4-in. and 7/16-in., \$2.40 base; 5/16-in., \$2.40 base. Boat and barge spikes, \$2.40 to \$2.50 base per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh. Track bolts, \$3.25 to \$3.50 base per 100 lb. Tie plates, \$2 per 100 lb. Angle bars, \$2.40 per 100 lb.

Terne Plates

Prices of terne plates are as follows: 8-lb. coating, 200 lb., \$9.30 per package; 8-lb. coating, I. C., \$9.60; 15-lb. coating, I. C., \$11.80; 20-lb. coating, I. C., \$13; 25-lb. coating, I. C., \$14.25; 30-lb. coating, I. C., \$15.25; 35-lb. coating, I. C., \$16.25; 40-lb. coating, I. C., \$17.25 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars, 1.50c. to 1.60c. from mill. Refined bar iron, 2c. to 2.10c.

Welded Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card:

Steel			Butt Weld			Iron		
Inches	Black	Galv.	Inches	Black	Galv.	Inches	Black	Galv.
1/4	54 1/2	28	1/4 to 3/8	36 1/2	18 1/2	1/4	36 1/2	18 1/2
1/2	60	33 1/2	1/2	42 1/2	27 1/2	1/2	42 1/2	27 1/2
3/4	65	50 1/2	3/4	44 1/2	29 1/2	3/4	44 1/2	29 1/2
1	69	56 1/2	1 to 1 1/2	44 1/2	29 1/2	1	44 1/2	29 1/2
1 to 3	71	58 1/2						

Lap Weld

Inches	Black	Galv.	Inches	Black	Galv.
2	51 1/2	28 1/2	2 1/2 to 6	42 1/2	29 1/2
2 1/2 to 6	55 1/2	33 1/2	7 to 12	40 1/2	27 1/2
7 to 8	51 1/2	33 1/2			
9 to 12	51 1/2	33 1/2			

Butt Weld, extra strong, plain ends

Inches	Black	Galv.	Inches	Black	Galv.
1/4	50 1/2	33	1/4 to 3/8	36 1/2	18 1/2
1/2	56	38 1/2	1/2	42 1/2	27 1/2
3/4	62	50 1/2	3/4	44 1/2	29 1/2
1	67	55 1/2	1 to 1 1/2	44 1/2	29 1/2
1 to 1 1/2	69	57 1/2			
2 to 3	70	58 1/2			

Lap Weld, extra strong, plain ends

Inches	Black	Galv.	Inches	Black	Galv.
2	50 1/2	28 1/2	2 1/2 to 6	40 1/2	27 1/2
2 1/2 to 6	54 1/2	33 1/2	7 to 8	43 1/2	30 1/2
7 to 8	53 1/2	33 1/2	9 to 12	42 1/2	29 1/2
9 to 12	61	47 1/2			
	55	41 1/2			

To the large jobbing trade the above discounts are increased by one point, with supplementary discounts of 5 and 2 1/2 per cent.

Boiler Tubes

The following are the discounts for carload lots f.o.b. Pittsburgh:

Lap Welded Steel		Charcoal Iron	
1 1/2 in.	26 1/2	1 1/2 in.	5
2 to 2 1/2 in.	41	2 1/2 to 3 in.	15
2 1/2 to 3 in.	52	3 to 3 1/2 in.	25
3 1/2 to 4 in.	57	3 1/2 to 4 1/2 in.	30
		4 1/2 to 5 in.	32

Standard Commercial Seamless Boiler Tubes

New discounts have been adopted on standard commercial seamless boiler tubes, but manufacturers are not yet ready to announce them for publication, and for that reason we publish no discounts this week.

Sheets

Prices for mill shipments on sheets of standard gage in carloads, f.o.b. Pittsburgh, follow:

Blue Annealed

Cents per Lb.	Cents per Lb.
No. 8 and heavier.....2.20	Nos. 11 and 12.....2.30
Nos. 9 and 10 (base).....2.25	Nos. 13 and 14.....2.35
	Nos. 15 and 16.....2.45

Box Annealed, One Pass Cold Rolled

Cents per Lb.	Cents per Lb.
Nos. 17 to 21.....2.80	No. 28 (base).....3.00
Nos. 22 to 24.....2.85	No. 29.....3.10
Nos. 25 and 26.....2.90	No. 30.....3.20
No. 27.....2.95	

Galvanized

Cents per Lb.	Cents per Lb.
Nos. 10 and 11.....3.00	Nos. 25 and 26.....3.70
Nos. 12 to 14.....3.10	No. 27.....3.85
Nos. 15 and 16.....3.25	No. 28 (base).....4.00
Nos. 17 to 21.....3.40	No. 29.....4.25
Nos. 22 to 24.....3.55	No. 30.....4.50

Tin-Mil Black Plate

Cents per Lb.	Cents per Lb.
Nos. 15 and 16.....2.80	No. 28 (base).....3.00
Nos. 17 to 21.....2.85	No. 29.....3.05
Nos. 22 to 24.....2.90	No. 30.....3.05
Nos. 25 to 27.....2.95	Nos. 30 1/2 and 31.....3.10

NON-FERROUS METALS

The Week's Prices

Dec.	Cents Per Pound for Early Delivery					
	Copper, New York		Lead		Zinc	
	Lake	Electro-lytic	Tin New York	New York St. Louis	New York St. Louis	
21.....	13.87½	13.62½	33.00	4.70	4.37½	5.25 4.90
22.....	13.87½	13.62½	32.62½	4.70	4.37½	5.25 4.90
23.....	13.87½	13.62½	32.62½	4.70	4.37½	5.20 4.85
24.....	13.87½	13.62½	4.70	4.37½	5.20 4.85
27.....	13.87½	13.62½	32.75	4.70	4.37½	5.17½ 4.82½

New York

NEW YORK, Dec. 27.

As the year draws to a close practically all the markets are firm and the tone is optimistic. Buying of copper has slackened but prices are tending higher. The tin market is temporarily inactive but firm. A quiet demand pervades the lead market at steady prices. The zinc market is slightly easier, but the technical situation is satisfactory.

Copper.—While inquiries continue in good volume, buying has slackened temporarily, but the market maintains its strength both as to prices and sentiment. There are even indications of a possibility of a shortage developing in the not distant future, due to the heavy demand, both past and prospective, and to the extremely low operating rate of the mines. It will take some time for the mining of copper to develop and there is some fear that the rate may not equal the demand in the coming months. There has been no change in prices, electrolytic copper for prompt and early delivery being still quoted at a minimum of 13.87½c., delivered, or 13.62½c., refinery, with first quarter at 14c., delivered, or 13.75c., refinery. There are some producers who are out of the market even at these prices. Foreign demand continues excellent and the technical and statistical position of the market as a whole is reported as eminently satisfactory.

Tin.—The market for Straits tin has been extremely dull the past week and there has been practically no demand either from dealers or consumers. In fact some dealers have been offering the market down, but there is some question as to whether these have resulted in sales or whether those making the offers were really willing to sell. At any rate, no one appears eager to take up the offering. As a result of this situation quotations, while largely nominal, have been a little lower, with spot Straits quoted to-day at 32.75c., New York. The London market has been closed since Friday, including to-day, which is observed there as "boxing day," and the trend of the market on that side is impossible to ascertain. Arrivals thus far this month have been 3635 tons with 4765 tons reported afloat.

Lead.—Conditions are unchanged with demand steady and prices firm. Fair sized orders are reported for various lines of consumption and demand for January shipment has been better than usual at this time of the year. The leading interest continues to quote 4.70c., New York and St. Louis, while in the outside market the prevailing levels are 4.35c. to 4.40c., St. Louis, and 4.70c. to 4.75c., New York. Prospects of exports to England continue good.

Zinc.—Demand is very light, as is natural in the closing weeks of the year, and has resulted in offerings from one or two sources slightly under the market so that prime Western in limited amounts can be obtained as low as 4.82½c., St. Louis, or 5.17½c., New York. Interest in first quarter is of sufficient volume to warrant expectation of good business in the near future and there is even some prospect of exports to England. There has been a decided expansion of business in galvanized sheets in Great Britain, particularly for export, and there are indications that American zinc may be cheaper than some other for British makers of these

sheets. The technical situation of the market here is, however, satisfactory and pessimism does not prevail.

Antimony.—Wholesale lots for early delivery are quoted unchanged at 4.50c., New York, duty paid, with demand exceedingly light.

Aluminum.—The leading producer continues to quote virgin metal, 98 to 99 per cent pure, in wholesale lots for early delivery, at 19c., f.o.b. plant, but is probably meeting offerings of the same grade from importers at 17c. to 18c., New York, duty paid. Demand is very light.

Old Metals.—Business remains quiet but values are well sustained at the following quotations:

	Cents Per Lb.
Copper, heavy and crucible.....	13.35
Copper, heavy and wire.....	12.50
Copper, light and bottoms.....	10.00
Heavy machine composition.....	10.25
Brass, heavy.....	8.00
Brass, light.....	6.00
No. 1 red brass or composition turnings.....	8.25
No. 1 yellow rod brass turnings.....	6.25
Lead, heavy.....	4.25
Lead, tea.....	3.25
Zinc.....	3.00

Chicago

Dec. 27.—Tin and spelter have declined slightly while the other metals remain unchanged in a quiet market. Among the old metals brass and some grades of copper have advanced. We quote in carload lots: Lake copper, 13.75c.; tin, 33.75c.; lead, 4.45c.; spelter, 4.82½c.; antimony, 6.50c., in less than carload lots. On old metals we quote: Copper wire, crucible shapes and copper clips, 10.75c.; copper bottoms, 8c.; red brass, 8.25c.; yellow brass, 5.75c.; lead pipe, 3.25c.; zinc, 2.37½c.; pewter, No. 1, 23c.; tin foil, 24c.; block tin, 26c.; all buying prices for less than carload lots.

St. Louis

DEC. 27.—Lead has been slightly easier at 4.30c. to 4.40c. car lots, while slab zinc was about steady at 4.85c. On old metals we quote: Light brass, 3.50c.; heavy red brass and light copper, 7c.; heavy yellow brass, 4c.; heavy copper and copper wire, 7.50c.; inc, 2c.; pewter, 15c.; tin foil, 16c.; tea lead, 2c.; aluminum, 9c.

Industrial Health Measures in Cincinnati

"Industrial medicine is preventative medicine practised on the firing line" was the key statement of an article by Dr. Otto P. Geier, Cincinnati Milling Machine Co., Cincinnati, in the December issue of *Nation's Health*. The author is brother of Frederick A. Geier, president of that company. The article describes the Cincinnati Health Exposition held in that city recently. The exhibit contained booths representing the proper kind of shop surroundings and those containing the wrong kind; also many charts and posters. Machinists were at work in the good and the bad booths drawing attention to their work by the sparks from their emery wheels.

In describing industrial health conditions in Cincinnati the author says: "The collected data showed that almost invariably the sickness rate and absence because of sickness was materially reduced, some instances being cut in half; that lost time from infected wounds after installation of medical service, with its prompt and proper treatment, reduced infection cases to the negligible point. The effort to collect comparable statistics proved to the co-operating medical departments the necessity for standardizing their records and in the interest of determining what may reasonably be considered the irreducible minimum of record that will still furnish sufficient information for intelligent deductions as to monetary and other values of health work in industry.

"It was useful, for instance, to contrast the fact that while eight industries furnished 11,800 men, convenient clinical facilities for 250,000 visits in 1920, the out-patient department of the Cincinnati General Hospital, with its score or more of physicians and nurses, afforded but 10,000 patients clinical facilities for 30,000 visits. Even with free medical service the cost approximated \$20,000."

PERSONAL

Peter R. Foley, formerly general manager of sales Eastern Steel Co., and J. Harries Pritchard, at one time identified as operating superintendent of Republic



P. R. FOLEY

Iron & Steel Co., have taken over the Slatington Rolling Mills at Slatington, Pa., and will start operation about Feb. 1. The mill will be operated under the name of Foley Steel Co., with general offices at Slatington, Pa., and have its branch office in the Harrison Building, Philadelphia. It is the intention to manufacture merchant steel and iron bars of the following range of sizes: Rounds and squares, $\frac{1}{2}$ in. to 3 in.; flat bars, $\frac{1}{4}$ in. to 6 in. widths; reinforcing concrete bars, plain and deformed.

The company will also specialize on small steel special sections, low phosphorous muck bar for cruci-

ble steel mixtures, stay bolt iron, etc.

Mr. Foley has been connected with the iron and steel industry since boyhood and is widely known. He served 22 years with the pioneer bridge builders, Coffrode & Saylor, who operated the bridge works at Pottstown, Pa. (now owned by McClintic-Marshall Co.), also the Reading Rolling Mill Co., at Reading, Pa., rising with them from a minor position to treasurer of both companies. He was elected treasurer of the Eastern Steel Co. at its organization in 1902, served in that capacity until 1905, when he opened its sales office in Philadelphia, and subsequently, in 1915, was appointed general manager of sales, which office was recently abolished. He was in the service of the Eastern Steel Co. about twenty years.



J. H. PRITCHARD

Mr. Pritchard, the associate of Mr. Foley, descends from the early iron and steel men of the United States, his grandfather, John Pritchard, being a roller in the Pittsburgh mills back in the 40's and afterwards was one of the owners of the first rolling mill at Ironton, Ohio. Mr. Pritchard began his career in the Birmingham, Ala., district and was for many years superintendent of the Republic Iron & Steel Co. and the Tennessee Coal, Iron & Railroad Co.'s rolling mills.

James H. Hammond, for 24 years president Superior Steel Co., and for the past five years chairman of the board of directors Superior Steel Corporation, has resigned. Henry F. Devens, for many years associated with the Superior Steel Corporation, formerly vice-president and more recently as special agent, has severed that connection. Henry D. Sarge, secretary and assistant treasurer Superior Steel Corporation, has resigned from both positions and connection with the corporation. Frank R. Frost, assistant sales manager Superior Steel Corporation for the past few years, has severed his connection with the corporation. Messrs. Hammond, Devens and Frost have taken temporary offices at 565 Union Arcade Building.

Frank L. Campbell, formerly manager of sales of the roofing department of the Beaver Board Co., Buffalo, has resigned, and on Jan. 2, will accept the

position of general manager of sales of the United States Chain & Forging Co., Union Arcade, Pittsburgh. He succeeds Charles M. Power, who recently resigned.

B. A. Tozzer, who has been traveling in the Far East for the past 14 months, investigating the business outlook in respect to machine tools for the Niles-Bement-Pond Co., has returned to Cleveland and resumed his former position as manager of the Cleveland office of the Pratt & Whitney Co. and the Niles Tool Works Co. During his travels he visited India, Java, China, Burma, Siam, the Straits Settlement and other Far Eastern countries.

H. A. Kimber, formerly of the Quigley Furnace Specialties Co., is now in charge of the sales of the Quigley pulverized fuel department of the Hardinge Co., 120 Broadway, New York. This change was made owing to the acquirement by the Hardinge company of the pulverized fuel department of the Quigley company. L. W. Marso, who is in charge of the branch office of the Quigley company, at 427 Oliver Building, Pittsburgh, has now become associated with the Hardinge Co., 120 Broadway, New York, and will continue in the Pittsburgh office under the name of Hardinge Co., but will specialize in the handling of the Quigley pulverized fuel systems, which department has been acquired by the Hardinge Co. from the Quigley company. O. M. Rau, formerly consulting engineer to the Philadelphia Rapid Transit Co., has also joined the Hardinge Co., and will specialize in the handling of Quigley pulverized fuel systems as applied to boilers. W. O. Renkin has affiliated with the Hardinge Co. as managing engineer of the Quigley pulverized fuel department.

George C. Calvert, purchasing agent of the American Road Machinery Co., Inc., Kennett Square, Pa., was installed president of the Purchasing Agents' Association of Philadelphia at the annual meeting held at Kuglers on Dec. 8. This association is in a thriving condition, having a membership of 250, although it was only organized about six years ago.

A. H. Bauman has been elected vice-president and director of the Cleveland Duplex Machinery Co., Cleveland. He was formerly general foreman of the gun division, the American Brake Shoe Works, Erie, Pa. For the past three years he has been associated with the Cleveland Duplex Machinery Co. as sales engineer.

Arthur J. McMasters, 819 Bessemer Building, Pittsburgh, has been appointed sales representative in the Pittsburgh district for the Storms Drop Forging Co., East Springfield, Mass., and the Brown Bag Filling Machine Co., Fitchburg, Mass. In addition to the above, Mr. McMasters is also sales representative in the Pittsburgh district for the Bickford Switzer Co., Greenfield, Mass.; Alert Tool Co., Philadelphia; Gammons Holman Co., Manchester, Conn.; Welded Products Mfg. Co., Milwaukee; Rigid Tool Holder Co., Washington; Arnold Electric Tool Co., New London, Conn.; Superior Saw Mfg. Co., Long Island, N. Y.; Velco Mfg. Co., Greenfield, Mass.; Van Keuren Co., Boston, and the Geneva Society of New York and Switzerland.

B. H. Anibal, formerly chief engineer Cadillac Motor Car Co., Detroit, has been appointed chief engineer of the Peerless Motor Car Co., Cleveland.

J. E. Holveck has been appointed district sales representative for the rotary pump line of the Exeter Machine Works, Inc., West Pittston, Pa., in the Pittsburgh district. Until recently he was with Crawford & Cameron, Pittsburgh, and was at one time designing engineer for the Aldrich Pump Co., Allentown, Pa. Mr. Holveck is a hydraulic engineer with extensive experience in the design and sale of pumping machinery, and is the patentee of novel and interesting improvements applicable to high-pressure pump work.

William S. Dickson has been appointed assistant manager of the Crane Machinery Co., Buffalo, N. Y. For many years he was with the Cincinnati Planer Co. and later became sales engineer of the Acme Machine Tool Co., and general manager of the Greaves-Klushman Tool Co. During the past two years he has been connected with the Cleveland office of W. K. Stamets.

OBITUARY

THOMAS MURRAY, assistant secretary, assistant treasurer and director of the United States Steel Corporation, died Nov. 27, aged 54, after a long illness.

Mr. Murray was born in Jersey City, Dec. 14, 1867, attended public school and high school in Jersey City and began work in a law office at the age of 14. He became connected with the Federal Steel Co. in May, 1894, and was appointed assistant secretary of the United States Steel Corporation upon its organization in April, 1901. On Nov. 11, 1919, he was appointed assistant treasurer. He had been a director for about eight years and was also a director of many of the subsidiary companies of the Steel Corporation. On June 23, 1897, he married Miss Mary C. Flynn of Jersey City, who survives. He was a member of the Railroad Club and of a number of social clubs. Judge Gary said of him Tuesday: "He was a man of high character, more than ordinary ability, trusted and beloved by all his associates in the Steel Corporation and its subsidiaries."



THOMAS MURRAY

NELSON S. BARTLETT, retired iron merchant, died at the home of his sister at 227 Commonwealth Avenue, Boston, Dec. 23. He was born in Boston, April 11, 1848. During his earliest business life, Mr. Bartlett was associated with the Hondlette, Ellis & Co., Boston, iron and steel merchants. When the affairs of that company wound up, he started in business for himself as an importer of Scotch and English pig iron, rails, beams, etc. Later, he formed a partnership with George H. Curtis, as N. S. Bartlett & Co., and employed John O. Henshaw, then secretary of the Boston Bridge Works, as salesman. Approximately four years later Mr. Henshaw was taken into the firm and a few years later Mr. Curtis retired from the partnership. At this time the firm sold Mary, Ohio, Scotch pig iron, made by the Mary furnace, Louisville, Ohio, in connection with Scotch irons. In addition, it sold Rebecca iron, made at Kittanning, Pa., by the Kitanning Iron & Steel Mfg. Co. The firm also acted as agents for other irons, notably Woodward and Crozier. The firm's office was at 126 State Street, Boston. In 1909, Mr. Bartlett retired from active business devoting his entire attention to the management of several estates. The firm was dissolved and the business absorbed by Hickman, Williams & Co. Mr. Bartlett was a member of Boston's oldest clubs.

DOUGLAS F. McKEY, secretary-treasurer Durant Mfg. Co. and American Filter Mfg. Co., 655-665 Buffum Street, Milwaukee, died Dec. 13 after a brief illness with pneumonia, at the age of 33 years.

FRANK J. TURK, Joseph Turk Mfg. Co., Bradley, Ill., bedsteads, died on Dec. 12.

ANTON MILL, SR., president A. Mill Engineering Co., Cincinnati, died at his home in that city on Dec. 20, at the age of 72 years. He had been in the engineering business for more than 20 years. Previous to organizing the company which bears his name, Mr. Mill had an interest in the old Bickford Machine Tool Co., Cincinnati.

CHARLES M. BEGOLE, president of Chevrolet Motor Co. and one of the founders of the Buick Motor Co., died at St. Petersburg, Fla., Dec. 22. Mr. Begole, a son of the late Josiah Begole, former Governor of Michigan, was 73 years old. His home was in Flint, Mich.

THOMAS FINDLEY, president Massey-Harris Co., To-

ronto, Ont., died at his home, 146 Warren Road, Toronto, Dec. 19. He had been in poor health for the past year, and had been forced to take to his bed five weeks ago. A year and a half ago he resigned to Thomas Bradshaw the duties of general manager of the Massey-Harris Co. He became associated with the Massey-Harris Co. in 1890, at that time holding the position of telegraph operator. In 1895 he became chief accountant, in 1902 assistant to the president, in 1907 assistant general manager, in 1909 a director, in 1912 vice-president and in 1917 president and general manager. He was 52 years old.

Car Loadings Decline

Revenue freight loadings for the week ended Dec. 10 showed 742,926 cars in use, a decrease for the week of 4528 cars, 95,027 cars less than the same week last year, and 12,014 cars below the showing of two years ago. Were it not for the heavy traffic in grain and grain products and seasonal increase in merchandise loadings, the showing as compared with previous years would be much worse. The main losses are attributed to the coal movement, which is showing heavy losses, despite the reduced temperatures for a large part of the country. The output of the mines is small and stocks at terminal markets, while not regarded as heavy, appear sufficient for the time being. Every Western road is storing cars of all kinds; even box cars on a few roads are in excess supply, in the face of the big movement of corn which is the largest at this time in years.

Exports Decline

WASHINGTON, Dec. 27.—American exports to Europe declined \$43,000,000 in November as compared with the previous month, according to an official summary of foreign trade issued to-day by the Department of Commerce. Imports from Europe increased in the same period about \$3,500,000.

Only to Africa and Oceania was the outgoing trade of the United States greater in November than in October, the increase in the case of Africa being \$700,000 and to Oceania \$3,400,000.

Initiative Lies With Europe

WASHINGTON, Dec. 27.—Any initiative in the matter of economic conferences must come from Europe, it was indicated to-day by American officials. The American view is that European nations have the primary responsibility for their own reconstruction and that the United States cannot advisedly propose remedies or institute international negotiations unless the nations most chiefly concerned have acted.

"Underground Loading Devices in Metal Mines" by C. Lorimer Colburn, mining engineer of the United States Bureau of Mines, is the subject of a short bulletin issued by the bureau, in which are given descriptions, operating methods and the performances of mechanical shovels now in use in metal mines of the United States. The machinery considered includes the following: Hunt rotary shovel, Myers-Whaley shoveling machines, Conweigh digger belt-loader and Conweigh shovel loader, Shuveloder, Armstrong shovel, Thew underground mining shovel, Marion shovel, Hoar underground shovel, Keystone excavator and various developments of scrapers and slushers.

C. F. Yocum, general foreman Buckeye Traction Ditcher Co., Findlay, Ohio, has been appointed superintendent to succeed L. A. Krupp, who resigned to accept the position of manager with the North Baltimore Tractor & Machine Co., North Baltimore, Ohio.

Percival Johnson, president Pulaski Iron Co., Philadelphia, was elected president of the Virginia Pig Iron Association at its monthly meeting on Dec. 20.

BOOK REVIEWS

Waste in Industry. By the Committee on Elimination of Waste in Industry of the Federated American Engineering Societies. Pages 409, 6 x 9 in. Published by the Federated Engineering Societies, Washington, and for sale by the McGraw-Hill Book Co., 370 Seventh Avenue, New York. Price, \$4.

This volume of over 400 pages presents the results of the first public service undertaken by the Federated American Engineering Societies. This service was a rapid, intensive study by Herbert Hoover and seventeen engineers appointed by him as the Committee on Elimination of Waste in Industry, of conditions making for inefficiency and lost production in a large number of representative plants in six typical branches of industry.

Waste, in the sense here used, is the complement of the efficiency ratio. If 100 per cent represents the maximum of productive capacity, and in a given plant but 70 per cent efficiency is attained, the lost 30 per cent represents the waste. In order to obtain a fair summary of the conditions, a standard questionnaire was first developed. This was classified under three heads. The first, organization, dealt principally with management and labor. The second, technical, dealt with the plant equipment, materials, and products, and the degree of accurate knowledge available to control these factors. The third, utilization, covered the operating practices with respect to financing, cost keeping and production control. The results are stated in "points" of waste, on a scale grading from excellent at zero through fair at 40, to bad at 80.

The summarized points of waste are for the building trades an average of 53; men's clothing trade, best plant, 27, and worst, 83; boot and shoe trade, best 12½, worst 71; printing shops, an average of 60; and textile trades, an average of 50. The showing in the metal trades is undoubtedly of the most interest to the readers of THE IRON AGE. The best of the shops studied showed only about 6 points of waste, and the highest figure was 56, with an average of 30.

The greatest cause of waste in industry appears to be fluctuation in the rate of work. This is seasonal, or due to changes in style or fashion, or to irregularity in receiving materials, or in working them through the departments, or to the various causes that make a labor turnover of 60 per cent remarkably good, and the condition of having to hire ten persons to keep one at work only too common. Overhead, interest and other charges are the same whether a machine works full time or only half time; and with the large proportion of idle machine time that exists in almost all shops, there is no more direct route to increased dividends than to find ways of keeping the machines at work.

The book contains also reports on general causes of waste in industrial production, such as unemployment, strikes, accidents and loss by ill-health of workers. Much useful information for the statistician and the student of economics is here available. But the practical manufacturer who takes up "Waste in Industry" in the expectation of finding a ready remedy for the waste within his own plant, is likely to be disappointed when he discovers that nowhere in the four hundred pages is there a chapter entitled "How to Reduce Waste in Industry."

S. H. B.

Hendricks' Commercial Register of the United States.—Pages 2324, 8½ x 11½ in. Published by S. E. Hendricks Co., 70 Fifth Avenue, New York.

A conspicuous feature of the new issue of Hendricks' Commercial Register is the change in size to conform to 8½ x 11½-in. size. This gives a type page of 7 x 10 in., instead of 6 x 8 in., and allows 25 per cent more matter on each page than formerly. Under ordinary conditions this change in size would reduce

the number of pages 25 per cent, or from 2800 to 2100. Sufficient material has been added, however, to make the total number of pages in excess of 2300. The resulting reduction in the thickness makes the book easier to handle, notwithstanding that it contains more material than any previous edition. The text matter has been opened up, leaving a space between columns, which contributes to easier reading and allows space for check marks and short memoranda.

The lists given cover the electrical, engineering, machinery, building and other industries. The lists covering twist drills, fire doors and electric lamp sockets have been handled more comprehensively than usual.

Books Received

Mineral Industry During 1920. Vol. xxix. Edited by G. A. Roush. Pages xx + 907; 6¼ x 9¼ in.; numerous tables and illustrations. Published by the McGraw-Hill Book Co., 370 Seventh Avenue, New York. Price, \$10.

Coal Manual. By F. R. Wadleigh. Pages 200, 4¼ x 6 in. Published by *National Coal Mining News*, 834 Union Trust Building, Cincinnati, Ohio. Price, \$2.50.

A Course in Mechanical Drawing. By Louis Rouillon. Pages 92, 6½ x 7½ in.; fully illustrated. Published by the Norman W. Henley Publishing Co., 2 West Forty-fifth Street, New York. Price, \$1.50.

Short Trade Items

The Combustion Engineering Corporation, New York, has opened a new branch office at 806 First National Bank Building, Pittsburgh, in charge of W. C. Stripe, formerly manager of the Philadelphia office.

A new metal stamping company has just been formed under the name of The Winkler Mfg. Co., Inc., 248 Lafayette Street, New York. This company is in charge of Jack Winkler, formerly in charge of estimates of the Charles Fishers' Spring Co. Mr. Winkler has been specializing in combination dies for the past ten years, and is ready to estimate on metal stamping in all its branches. The Winkler Mfg. Co. also owns some patents, which it is manufacturing, among which are a sanitary tooth brush holder and a ticket dispensing machine.

The Wilson Welder & Metals Co., has moved its general offices and Bush Terminal factory to 132 King Street, New York, telephone Spring 7994. It has installed improved special equipment to handle certified plastic arc welding metals more efficiently, including a fully-equipped demonstration room where is displayed the Wilson plastic-arc system, the one that was used to repair the intentionally damaged interned German ships.

Sidney Norwood, who for a great many years has been selling in Michigan the product of the Interstate Iron & Steel Co., Griffin Mfg. Co. and Massillon Rolling Mill Co., is going into business for himself as a manufacturers' agent and will handle, among other lines, the account of the Elliott-Blair Steel Co., New Castle, Pa., in the state of Michigan. His office is at 912 Kresge Building, Detroit.

The Boston office of the Cutler-Hammer Mfg. Co., Milwaukee, has been moved from the Columbian Life Building to rooms 403 and 404 Harvey Building, Chauncy Street. C. W. Yerger is manager.

The York Modern Corporation, Unadilla, N. Y., incorporated with a capital of \$30,000, will manufacture road building machinery. It will rent a factory for the first year.

The Lebanon Steel Foundry, Lebanon, Pa., has purchased the plant of the Rivetless Chain & Engineering Co. at Lebanon, which will be incorporated under the name of the Lebanon Drop Forge Co. The plant is complete in every respect and while the new owners have plans for enlarging it and adding to the equipment, they will not do so at the present time.

The Keller Pneumatic Tool Co., Grand Haven, Mich., has changed its name to William H. Keller, Inc.

A. Lewinsohn & Sons, 61 Broadway, New York, are having plans prepared and will soon take bids for the erection of a two-story automobile service and repair building, 50 x 60 ft., at Broadway and 135th Street, estimated to cost \$90,000. John De Hart, 1041 Fox Street, is architect and engineer.

Machinery Markets and News of the Works

HOLIDAY PERIOD ACTIVE

Delaware & Hudson Has New Inquiry for Seven Machines

American Woolen Co. Purchased 18 Tools—New England Machinery Market Is Especially Active

The holiday period is proving to be less dull than in many years. It is reported from New England that sales the past week have been three times as great in volume as any other one week this month; furthermore, that December has been a better month than November and that August was decidedly the turning point of the year.

The Delaware & Hudson Railroad, Albany, N. Y., has put out an inquiry for seven tools. Purchases expected after Jan. 1 include those by the Rock Island, the Santa Fe and the Delaware, Lackawanna & Western railroads. The purchasing department of the last

railroad has passed on the 40 tools asked for and approval must now be secured from the finance board. The Rutland, Bangor & Aroostook and the Maine Central each have small lists under consideration, but appropriations for their purchases have not been made.

The American Woolen Co. has bought 18 machine tools for its Shawsheen machine shop, the order having been placed with two houses. One of the largest orders in the Middle West was that placed by the Beatty Machine & Mfg. Co., Hammond, Ind., which company has a contract to supply complete equipment for the Richmond Car Co., Richmond, Va. The Junior High School of South Bend, Ind., closed for seven South Bend lathes. The Phoenix Horse Shoe Co., Joliet, Ill., has purchased three good-sized tools for its Poughkeepsie, N. Y., plant, and contemplates a boring mill.

A few inquiries from France are being turned to Cincinnati builders, but the unfavorable exchange has made immediate business unlikely. A New Hampshire city is making up a list of shop equipment for a new school involving about \$30,000 worth of machinery.

New York

NEW YORK, Dec. 27.

The Delaware & Hudson Railroad, Albany, N. Y., has issued an inquiry for the following machines:

- One 60-in. planer.
- One 42-in. boring mill.
- One 30-in. lathe.
- One flanging press.
- One forcing press.
- One driving-wheel press.
- One double-head shaper, 26-in. x 12-ft.

It is expected that purchases will be made by the Delaware, Lackawanna & Western Railroad within a week or two weeks. The purchasing department has passed upon the quotations received on its list of about 40 tools, and if the finance board approves of the purchase the orders will go out shortly. Additional inquiries for a few tools have been sent out, including a lathe, frog and switch planer.

Holiday dullness pervades the machine-tool market, but improvement is looked for after Jan. 1.

The Bullard Machine Tool Co., Bridgeport, Conn., reports a decided improvement in its business during December. A considerable number of orders have been received, including one early in the month for eight multi-automatic machines.

The crane market is dull, but prospects for real activity in January and February are generally considered good. Second bids on the 34 gantry cranes for the New York city docks at Stapleton, S. I., were opened Dec. 21. The low bid was presented by the Wellman-Seaver-Morgan Co., which quoted \$276,268 or \$8,125 each against its former bid of \$339,873 or \$9,996.26 each. Heyl & Patterson, previously the low bidder with a price of \$301,308 or \$8,862 each, quoted on the new opening \$280,228 or \$8,242 each. Only three other companies submitted bids: McMyler Interstate Co., \$317,934; the Niles-Bement-Pond Co., \$345,950, and the Dravo Contracting Co., which was high, \$350,710.

Among recent sales are: Cleveland Crane & Engineering Co., a 2-ton, 20-ft. span overhead traveling crane with hoist to the Laurel Lumber Co., Laurel, Del., and a 2-ton tramrail with 400-ft. travel to the John F. McGowan Marble Co., 23 East 107th Street, New York; Champion Engineering Co., a 5-ton, 32-ft. span overhead traveling crane to the Union Tool Co., Carnegie, Pa.; Shepard Electric Crane & Hoist Co., a 2-ton, 30-ft. span, single I-beam crane to the Burnham Boiler Works, Irvington, N. Y. Linde & Griffith, Inc., Newark, N. J., has purchased a 30-ton, 50-ft. boom, second-hand Browning locomotive crane from Philip T. King, 30 Church Street, New York. The Booth Brothers & Hurricane Isle Granite Co., 208 Broadway, New York, recently in the market for a locomotive crane has purchased a 15-ton second-hand Industrial for its Vermont quarry.

The Slaterry Engineering & Construction Co., 10 East Forty-third Street, New York, has purchased property, 50 x 100 ft., on Inwood Avenue, for the erection of a new plant.

The J. L. Hammett Co., 55 Thirty-third Street, Brooklyn, manufacturer of school equipment, will soon take bids for a new four-story plant at Newark, N. J., estimated to cost \$100,000. Arthur C. Holden, 101 Park Avenue, New York, is architect.

Vocational departments will be installed in the high schools to be erected by the Board of Education, 500 Park Avenue, New York, on Second Avenue, between Sixty-seventh and Sixty-eighth streets, and at Amsterdam Avenue and 183d Street, respectively. The first noted will be five-stories, 128 x 196 ft., estimated to cost close to \$1,000,000; and the other, four-stories, 195 x 300 ft., to cost about \$250,000. Anning S. Prall is president of the board. C. B. J. Snyder, Room 2800 Municipal Building, is architect.

The G. Piel Co., Steinway and Jackson avenues, Long Island City, manufacturer of automobile equipment, has leased the brick factory on an adjoining site for extensions.

The American Smelting & Refining Co., 120 Broadway, New York, has preliminary plans under way for the erection of a large metallurgical experimental plant at El Paso, Tex., to be used for ore testing, etc.

The Brooklyn Edison Co., 360 Pearl Street, Brooklyn, will call for bids early in February for its electric generating plant at the foot of Sixty-sixth Street, estimated to cost about \$1,200,000. Plans are being prepared. G. L. Knight, company address, is engineer.

Albert Kellar, 1744 Garfield Street, Bronx, New York, will commence the erection of a one-story ice plant, 60 x 100 ft., at 409-15 East 108th Street, estimated to cost about \$30,000.

Sutliff, Inc., Maiden Lane, Kingston, N. Y., will take bids at once for a two-story automobile service and repair works, 60 x 100 ft., estimated to cost about \$42,000. W. Sutliff is president.

The Cornwall Industrial Corporation, Cornwall Landing, N. Y., has had plans prepared for a new one-story plant, 50 x 180 ft. E. L. Olson is superintendent.

Fire, Dec. 13, destroyed the forge shop and wagon works of Joseph J. LeCompte, 64-66 Hoosick Street, Troy, N. Y., with loss estimated at about \$16,000. It is planned to rebuild.

The New York Central Railroad Co., New York, will continue in the direct management of its car and locomotive shops at Elkhart, Ind., and will not lease the plant to private interests. The shops have been giving employment to about 500 men.

The Keystone Tire & Rubber Co., 1877 Broadway, New York, will operate the new plant of its subsidiary organization, the Gryphon Tire & Rubber Co., now in course of erection, for the manufacture of Keystone cord tires with a daily output of about 1000.

The Long Island Lighting Co., 50 Church Street, New York, operating at Northport, L. I., and vicinity, has made application to build a new electric power plant at Southold, L. I. E. L. Phillips is president.

The Transcontinental Oil Co., 576 Fifth Avenue, New York, with refineries at Tulsa, Okla., is planning for extensions and improvements in its plants, including new machinery and the purchase of new properties. Stockholders have approved a bond issue of \$10,000,000, and a portion of the fund will be used for this purpose.

Fire, Dec. 22, destroyed a portion of the five-story factory at 49-71 Clymer Street, Brooklyn, occupied by Charles Leffler & Co., machinists; the Kay Co., manufacturer of springs and other industrial interests with loss estimated at about \$25,000.

The Pennsylvania Motors Corporation, care of H. W. Scofield, 1719 North Broad Street, Philadelphia, will take bids until early in January for its one-story plant at Pleasantville, N. J., 50 x 300 ft., with power plant. It is estimated to cost close to \$125,000. C. Donehower, Pleasantville, is architect.

Christian Feigenspan & Co., 50 Freeman Street, Newark, N. J., have filed plans for a one-story ice plant at Bishop and State streets, Jersey City, N. J., estimated to cost \$25,000. It is preliminary to a large plant.

Electric motors and other equipment will be installed in the one-story plant, 100 x 150 ft., to be erected by S. Denier & Son, 15 Crosby Street, New York, at West New York, N. J., for the manufacture of mirrors, etc., estimated to cost about \$50,000.

Fire, Dec. 21, destroyed the plant of the Heidelberg Casket Co., Hudson Boulevard and Fifth Street, North Bergen, N. J., with loss estimated at \$100,000, including machinery.

A vocational department will be installed in the three-story high school to be erected by the Board of Education, Madison, N. J., estimated to cost \$500,000. Preliminary plans are being prepared by Guilbert & Betelle, 546 Broad Street, Newark.

Bids will soon be asked for the erection of a two-story high school, 150 x 370 ft., to include a vocational department, by the Board of Education, Elizabeth, N. J., estimated to cost about \$700,000, including equipment. C. Godfrey Poggi, 275 Morris Avenue, is architect.

A manual training department will be installed in the addition being erected at the high school, Perth Amboy, N. J., and which is expected to be ready for the installation of equipment early in the spring. It will cost in excess of \$150,000.

New England

BOSTON, Dec. 27.

The outstanding feature of the New England machine tool market the past week was the purchase of 18 tools by the American Woolen Co. for its Shawsheen machine shop. The order was given to two local houses, a 30 in. planer, keyseater, 1½-in. bolt cutter, two 14-in. lathes, one 36-in. lathe, one universal tool grinder and a No. 2 universal milling machine going to one firm, and a 200-lb. hammer, 28-in. upright drill, sensitive drill, a 30-in. gear cutter, centering machine, wet tool grinder, 20-in. shaper, power hack saw, small speed and an 18-in. lathe going to the other. This purchase, together with others the past week, served to put the aggregate New England sales for December well above those for November and substantiate the belief that a turning point in the machine-tool market came in August. Sales each month since then have shown an increase over the preceding month.

With few exceptions, other sales concern single tools, but in the aggregate amount to approximately three times those for any previous week this month, and cover a wider assortment of equipment. They are about equally divided between new and used tools, and include a used 22-in. planer and a 20-in. x 8-ft. lathe to a Lakeport, N. H., interest; a used No. 3 Becker milling machine to a Biddeford manufacturer; a used four-spindle drill to a Salmon Falls, N. H., shop; a new 15-in. x 6-ft. semi-quick change lathe to a Roxbury maker of bearings; a 9-in. x 4-ft. lathe to a greater Boston garage, this tool passing through the hands of two dealers; a used 26-in. planer to a Brockton concern; two profilers to a western Massachusetts textile machinery maker; a used sensitive drill to a Worcester, Mass., manufacturer; a new 10½-ft. gap shear, weighing about 12 tons, to a Boston iron and steel company, and a set of gages, 80 blocks, costing close to \$1,000, to a Massachusetts firm.

With the possible exception of some cranes, the consensus of opinion is that little machine tool business will be closed the last week of 1921. The local trade, at least, is hopeful regarding the outlook for the early part of 1922. It is believed the prospect of railroad buying early next year warrants serious consideration. The Rutland, the Bangor & Aroostook and the Maine Central railroads each have under consideration small lists of equipment, but appropriations have not been made. The most promising railroad list is that of the Boston & Albany, which is in formation. The company has made up a fairly large list of tools it

desires to discard and is inquiring on machines for replacement. Up to date it has practically decided on 16 or 18, including a driving wheel lathe, 2500-lb. hammer, shapers, and 16-in., 18-in., 20-in. and 27-in. lathes, some of the latter to be used on brass fittings work. During 1921, the Boston & Albany was practically the only New England carrier whose purchases of machine tools amounted to anything. It has taken no definite steps regarding much needed equipment for 1922, but machine tool dealers are reasonably certain the company will be forced to take on some new machinery.

The replacement of quantity production machine tools is strongly favored by some large New England industrial plants. In addition, quite a volume of prospective business is under consideration by small manufacturers, both new and old. School business also should develop within the next three or four months. One New Hampshire city is making up a list of shop equipment it will need for a new school, involving \$30,000 of machinery, but the date for opening bids is yet remote.

No local sales of cranes are reported this week. For a small New Haven contract, namely, the placing of a new crane on the city dock, 12 firms submitted bids ranging from \$575 to \$1,100. Award was made to the New Haven Electric Co.

The Waltham Watch Co., Waltham, Mass., has secured a large order for speedometers, covering 1922 requirements, from the Packard automobile interests, for the new Little Six car. The watch company has covered on its die castings requirements for this order.

The Fire Chief Corporation, capitalized for \$100,000 has been organized by J. Franklin Wilkinson, Herbert W. Blake, C. L. Rice, William E. Lee and Marcus E. Osgood, all of Gardner, Mass., to manufacture toys and novelties. Manufacturing operations will first be carried on at the plant of the F. W. Lombard Chair Co., South Ashburnham, Mass.

The three-story factory of the Lally Column Co., Cambridge, Mass., was recently badly damaged by fire. The upper part of the plant was ruined, while the lower floors, housing \$30,000 to \$40,000 worth of machinery were damaged by water.

The American Metal Co., Railroad Avenue, Attleboro, Mass., will move its plant to Janesville, Wis. Several of the employees will go West with the company.

The Thompson-Copeland Co., Worcester, Mass., metal specialties, recently incorporated under Massachusetts laws, has leased manufacturing quarters at 28 Cherry Street. It will produce lock washers, cotter pins, stamped metal, special screws and several other lines as soon as special machinery can be built.

The Peck, Stow & Wilcox Co., Southington, Conn., hardware, is planning to add three units to its works, comprising a hardening and annealing unit, 67 x 180 ft., grinding, 58 x 155 ft., and a forge shop, 65 x 100 ft.

The Bidwell Co., 1293 Main Street, Hartford, Conn., will build a two-story and basement garage and service station 75 x 122 ft., at East Hartford, Conn., to cost approximately \$150,000.

W. J. Hyland, 153 Dwight Street, Springfield, Mass., plumbing contractor, will erect a two-story and basement manufacturing unit, 50 x 95 ft., at 128 Liberty Street.

The London Steam Turbine Co., Troy, N. Y., has incorporated under Massachusetts laws, having acquired the rights and property of the Steam Motors Co., Springfield, and will manufacture steam turbines and appliances. It has an authorized capital of 10,000 shares preferred stock, par \$50, and 25,000 shares common, no par. William J. A. London, 70 Grenada Terrace, Springfield, is president. Carlos DeLeon, 303 Main Street, Springfield, vice-president, and Arthur J. Skinner, 46 Longmeadow Street, Longmeadow, treasurer.

The Service Engineering Corporation, capitalized for \$50,000 preferred stock and 10,000 shares common, no par value, has been granted a Massachusetts charter to manufacture automobile accessories at 568 East First Street, South Boston. Arthur L. Lewis, Newton, is president; Carroll W. Prochaska, Norwalk, Conn., vice-president and Frederick J. Shepard, Jr., Auburndale, treasurer.

C. N. James, 139 Brookline Street, Cambridge, Mass., manufacturer of automobile wheels, has broken ground for a one-story brick addition, 100 x 122 ft., estimated to cost about \$50,000. The machinery will be electrically operated, with individual motor and belt drive. Contract has been arranged for a supply of commercial power.

The New England Tank & Tower Co., Main Street, West Everett, Mass., is planning to rebuild the portion of its works destroyed by fire, Dec. 15, with loss estimated at about \$25,000.

The Cumberland County Power & Light Co., Portland, Me., has tentative plans for a new steam-operated electric generating plant, for auxiliary service, estimated to cost close to \$1,000,000.

A vocational department will be installed in the new

high school to be erected by the Board of Education, Winsted, Conn., estimated to cost \$150,000. Coffin & Coffin, 522 Fifth Avenue, New York, are architects.

The Union Specialty Co., 124 Hurd Avenue, Bridgeport, Conn., has plans under way for a new two-story factory, 50 x 125 ft., estimated to cost about \$50,000.

The Clark Power Co., Lewiston, Me., will commence the immediate erection of a new hydroelectric generating plant at the Union Falls on the Saco River. It will have an initial capacity of 22,000-h.p., which will be increased later. The entire development is estimated to cost in excess of \$1,000,000.

A vocational department will be installed in the two-story and basement high school, 120 x 242 ft., to be erected at Greenfield, Mass., estimated to cost \$500,000. L. C. Patton, 597 Fifth Avenue, New York, is architect.

The Clarendon Garage Corporation, Boston, has leased the three-story building at 48-58 Warren Avenue, totaling about 12,500 sq. ft., for the establishment of an automobile repair shop and service works.

Electric motors and other equipment will be installed in the two-story addition to be erected by the Acushnet Saw Mill Co., River Road, New Bedford, Mass., 60 x 80 ft., estimated to cost about \$35,000 with machinery. C. C. Smith is superintendent.

Ground will be broken at once by the Board of Education, Everett, Mass., for a three-story high school, 176 x 209 ft., to include a vocational department, estimated to cost about \$425,000.

Philadelphia

PHILADELPHIA, Dec. 27.

The Philadelphia Steam Heating & Engineering Co., Juniper and Cherry streets, Philadelphia, will take bids in about 60 days for a new two-story plant, 60 x 120 ft., at 3316-20 Lancaster Avenue, estimated to cost about \$60,000.

The Roth-Buick Co., Frankford Avenue, Philadelphia, has awarded contract to George W. Crossley, Bridge and Tacony streets, for a one-story and basement automobile service and repair building, at 4653-4659 Paul Street. Work will commence at once.

The United States Shipping Board, Washington, will soon commence dismantling a portion of the plant of the Merchant Shipbuilding Corporation, Bristol, Pa. Cranes and crane runways, yard equipment and other machinery will be placed on the market, it is said, at an early date. The Merchant company will continue to operate at the plant for some time to come.

The Middletown Ice Co., North Union Street, Middletown, Pa., is considering plans for a one-story addition to its ice manufacturing plant.

Electric motors and other power equipment will be installed in the three-story printing plant, 50 x 100 ft., to be erected by the Central Publishing Co., 329 Market Street, Harrisburg, Pa., at Thirteenth and Walnut streets, estimated to cost about \$150,000.

A one-story power plant will be constructed by the Taubel, Scott & Katzmillers Co., Shamokin, Pa., as its local textile mills. Plans have been completed.

The Vulcaweld Rubber Co., Pottstown, Pa., manufacturer of automobile tires, has acquired property on West High Street, 300 x 392 ft., for a new two-story plant, 60 x 260 ft., plans for which are being prepared. A one-story storage building will be built also.

Fire, Dec. 22, destroyed a portion of the power house of the Pennsylvania Power & Light Co., Allentown, Pa., at Danville, Pa., with loss estimated at about \$100,000, including equipment. It will be rebuilt.

Buffalo

BUFFALO, Dec. 27.

Freight handling, conveying machinery and other equipment will be installed in the five-story warehouse to be erected on the Niagara River, North Tonawanda, N. Y., at a cost of about \$250,000, by the McDermott Steel Co., North Tonawanda. The company has been organized recently with a capital of \$500,000 and is headed by T. J. McDermott, president; George Clinton, Jr., secretary, and H. M. Bone, treasurer.

A one-story automobile repair and service building, 40 x 140 ft., will be erected by the General Baking Co., 392 North Street, Rochester, N. Y. Gordon & Kaelberr, Sibley Building, are architects.

Fire, Dec. 20, destroyed a portion of the plant of the Stanford-Crowell Co., 1001 West Seneca Street, Ithaca, N. Y., manufacturer of cardboard specialties, with loss estimated at close to \$100,000, including machinery.

The Electro Refractories Corporation, Ellicott Square, Buffalo, manufacturer of crucibles, etc., is completing foundation work and will soon commence the erection of the

superstructure for its new plant at East Hamburg, 50 x 300 ft., with machine shop extension, 30 x 75 ft. It will cost about \$300,000, and will replace works recently destroyed by fire. L. U. Milward is manager.

The Jamestown Metal Desk Co., Blackstone Avenue, Jamestown, N. Y., will soon break ground for a one-story addition, 80 x 100 ft., estimated to cost approximately \$40,000. Beck & Tinkham, Frick-McGee Building, are architects.

Fire, Dec. 14, destroyed the plant of the J. B. Carr Co., Fourteenth Street, Colonie, N. Y., manufacturer of heavy chains and other mechanical products, with loss estimated at \$40,000. Preliminary plans are said to be under way for rebuilding.

Chicago

CHICAGO, Dec. 27.

The Rock Island and the Santa Fe will not take action on their respective lists until January. The latter road has sent out an additional inquiry for a 48-in. x 48-in. x 12-ft. planer with two heads on the cross rail and one head on the side. It is reported that the Union Pacific is about to issue an extensive list, but this has not been confirmed. As the year closes the market is quiet, new inquiries being few and orders largely small and infrequent. One of the largest orders recently taken was booked by the Beatty Machine & Mfg. Co., Hammond, Ind. This company has the contract to supply complete equipment for the plant of the Richmond Car Co., Inc., Richmond, Va. Included are large plate shears and multiple, single, double and horizontal punches which will keep the Beatty plant running at capacity for three and one-half months. In addition, the Beatty company purchased to apply against the same order a 12-ft. Dreis & Krump bending brake, a large bulldozer, Bradley hammers, Landis bolt and pipe cutters, and a number of machine tools, including a Cleveland open-side planer, lathes, shapers and drill presses. A 1500-ton hydraulic press is yet to be bought as well as additional miscellaneous equipment which, however, has been practically all arranged for.

Among other orders recently reported is one from the Phoenix Horse Shoe Co., Joliet, Ill., for a 24-in. and a 30-in. engine lathe and a 32-in. shaper for its Poughkeepsie, N. Y., plant. The purchase of a boring mill is also contemplated. For the junior high school at South Bend, Ind., mentioned a week ago, the Board of Education is reported to have closed for seven South Bend engine lathes, but still has a number of other machines to buy. The H. W. Johns-Manville Co., Madison Avenue and Forty-first Street, New York, has revived the inquiry for its new Waukegan plant, which was published in this column on July 18. There are 15 items in the list.

The West Side Ice Co., 937 North Hoyne Avenue, Chicago, has let contract for a one-story plant, 49 x 220 ft., to cost \$35,000.

The Anderson Stove Co., recently incorporated, Anderson, Ind., will re-open the Fraser Stove Co. plant in North Anderson about Jan. 10. The entire output, it is stated, has been contracted for by Montgomery-Ward & Co., Chicago. Kitchen ranges of various models will be manufactured. Directors of the company include John S. Keefe, Indianapolis, owner of the plant property, Jacob Keller, Belvidere, Ill., an experienced stove maker, and Joseph McMinn, Louisville, Ky., who has also been identified with the stove industry.

The Cornell Belting Co., Chicago, recently incorporated, has leased a plant at 162 West Austin Avenue, for a period of years. The company will confine itself to the manufacture of leather belting and has bought several leather working machines. The officers are E. H. Cornell, president; H. I. Fritts, vice-president; H. C. Schroeder, treasurer, and E. E. McGrath, secretary.

The Western Fixture Mfg. Corporation, manufacturer of store fixtures, 3039 Elston Avenue, Chicago, is receiving bids on a one-story addition, 80 x 119 ft., to cost \$40,000.

The Dental Metal Products Co., A. D. Gray, manager, 623 South Wabash Avenue, Chicago, is taking bids on a two-story factory and warehouse, 42 x 71 and 28 x 42 ft., respectively, at 7512-7518 Greenwood Avenue, to cost \$30,000.

The Paramount Knitting Co., Henry Polk, president, 337 West Madison Street, Chicago, has had plans prepared by Lockwood, Greene & Co., 33 South Dearborn Street, for a three-story reinforced concrete factory, 50 x 80 ft., at Kankakee, Ill., to cost \$50,000.

The Auto Specialty Mfg. Co., St. Joseph, Mich., has had plans prepared by Davidson & Weiss, 53 West Jackson Boulevard, Chicago, for two one-story foundry additions, 80 x 325 and 80 x 162 ft., respectively, to cost \$100,000. Bids will be taken after the New Year.

El Wendle, 4629 West Madison Street, Chicago, has let contract for a one-story blacksmith shop, 25 x 102 ft., to cost \$8,000.

The Elgin Watch Co., Charles H. Hubbard, president, 10 South Wabash Avenue, Chicago, has commenced work on

several four and five-story additions to its plant at Elgin, Ill., to cost \$500,000. Plans were completed fully two years ago.

The Bassick Mfg. Co., 361 West Superior Street, Chicago, manufacturer of lubricating devices, grease cups, etc., has preliminary plans for a new two-story and basement factory, 80 x 420 ft., on Addison Street. Stone & Webster, 38 South Dearborn Street, are architects and engineers.

C. A. Starr, 137 Park Place, Decatur, Ill., is planning for a one-story machine repair and automobile service works, 75 x 160 ft., estimated to cost \$42,000.

The Wyman-Gordon Co., 332 South Michigan Avenue, Chicago, manufacturer of forgings, has tentative plans for the construction of a new power plant at its works at Harvey, Ill., estimated to cost about \$100,000. Erection will be held in abeyance for a time.

The Common Council, Muscatine, Iowa, is planning for the construction of a municipal electric light and power plant, estimated to cost about \$250,000.

A vocational department will be installed in the two-story junior high school building, 150 x 150 ft., to be erected by the Board of Education, Minneapolis, Minn., estimated to cost close to \$500,000. E. H. Enger, City Hall, is architect.

The Diamond Calk Horseshoe Co., 4620 Grand Avenue, Duluth, Minn., is planning the erection of a two-story and basement building, 50 x 100 ft., estimated to cost about \$45,000. J. J. Wangenstein, Providence Building, is architect.

J. H. Baker and J. J. Clarke, Bedford, Iowa, are organizing a new company to construct an ice manufacturing and sold storage plant estimated to cost about \$200,000, including equipment. Plans will be prepared soon.

A vocational department will be installed in the three-story and basement high school to be erected at Decorah, Iowa, to be 80 x 140 ft., and estimated to cost about \$150,000. Temple & Burrows, 208 Main Street, Davenport, are architects.

Cleveland

CLEVELAND, Dec. 27.

While machine tool business continues dull, there is a better feeling in the trade which expects more activity early next year. The lack of interest on the part of buyers of machinery has to some extent disappeared and a few small inquiries have come from companies which advise that they expect to buy new equipment, but will do nothing definite about purchases before January. Although there is usually a little business during the holiday period, dealers made a number of sales in single machines the past week. Among the inquiries is one from the Herbrand Co., Fremont, which is in the market for milling machines for production work and is expected to purchase several of these machines.

The Williamson Hydraulic Clutch Co., Mt. Vernon, Ohio, recently organized to bring out a new type of clutch, has contracted with the Landis Tool Co., Waynesboro, Pa., for the use and manufacture of the clutch on a royalty basis.

The Urbana Tool & Die Co., Urbana, Ohio, has secured a large contract from an automobile company which, it is announced, will necessitate the operation of its plant at full capacity night and day for two or three months.

Cincinnati

CINCINNATI, Dec. 27.

The pre-holiday week, usually the dullest, is perhaps the exception this year in that the number of orders booked is on a par with the preceding weeks. The month of December will show a slight falling off, compared with November, but general conditions considered, manufacturers find much to encourage them. Inquiries for tools are coming from all parts of the country, and it is expected that after the first of the year, many will develop into orders. While most orders booked are for single machines, they are not confined to any one section and indicate that the gradual improvement is general. There has been little buying by the railroads and no action has been taken on any of the larger lists before the trade. It is expected that the Delaware, Lackawanna & Western Railroad and the Seaboard Air Line will close for equipment within the next week or two, and some action is also expected to be taken by the Rock Island. Industrial concerns in France are apparently picking up, as some inquiries were received from that country during the week. Export business, as a whole, however, is at a low ebb, and not much is expected from this source until exchange conditions are better.

The Illinois Car Co., Urbana, Ohio, has awarded contract to the Bellefontaine Bridge Co., for an erecting shop, 200 x 300 ft., of concrete, steel and glass. The company contemplates the erection of other buildings, but probably nothing

will be done until after the completion of the erecting shop.

The International Derrick & Equipment Co., Columbus, Ohio, recently acquired the plant of the Columbus Structural Steel Co., which it will rearrange for the fabrication of steel derricks for oil, gas and artesian well industries. It also plans the installation of galvanizing works. The company is capitalized at \$500,000 and is headed by Gordon Battelle and Harry M. Runkle.

The Held Tractor Co., Columbus, Ohio, manufacturer of tractors especially designed for use by truck gardeners, has purchased the building at 609-611 North Fourth Street, Columbus, and will make alterations preparatory to commencing operations on a larger scale. It has been operating in Columbus for over a year and increasing business makes larger quarters necessary.

Pittsburgh

PITTSBURGH, Dec. 26.

Due to the holiday season and inventory period, practically all pending inquiries are being held over until after the first of the new year. Several local dealers have some fair sized orders under negotiation, but do not expect to do anything definite until early next month. Railroads are buying very little and no important inquiries are out. Some time ago the Union Railroad of the Carnegie Steel Co., came into the market for a number of tools and later made some purchases, but it is still in the market for a heavy shaper, a heavy shear for cutting large channels and a radial drill. Orders for these tools are expected to be placed soon.

A local machinery house has definite inquiries for two monorail equipments for handling coal. These are nearly closed but the prospective buyers will not definitely place the contracts until next month. The local office of Manning, Maxwell & Moore has sold to the Sharpsburg Foundry Co., Sharpsburg, Pa., one 5-ton and one 10-ton Shaw electric crane, each 45-ft. span.

The Wheeling Steel Corporation has inquiries out for some heavy steel works equipment for its LaBelle Iron Works, Steubenville, Ohio. If this contract is placed the company will probably purchase a number of tools for the machine shops at the LaBelle works, or for a new machine shop that may be built.

The machinery market outlook for first quarter is regarded as fair, but it is not believed that any considerable amount of buying will set in until the second quarter. Prices of finished steel products are tending downward, and it will likely take all of the first quarter to stabilize the market. The railroads are not figuring in the market very largely.

The Elliott Co., Jeanette, Pa., has not yet closed on its inquiry for a 50-ton crane.

The Traver Engineering Co., Beaver Falls, Pa., has plans under way for the erection of a new one-story factory, 70 x 88 ft. Work will be commenced at an early date.

Fire, Dec. 21, destroyed the repair and service buildings of the Patton Automobile Co., Patton, near Johnstown, Pa., with loss estimated at close to \$40,000, exclusive of automobiles.

The Hecla Park Association, Bellefonte, Pa., is planning the construction of a new one-story electric light and power plant, estimated to cost about \$50,000. W. C. Rowe, Allegheny Street, is engineer.

The J. K. Davidson & Brother Sand Co., Pittsburgh, has awarded contract to the American Bridge Co., Ambridge, Pa., for the construction of twelve steel barges.

The Borough Council, Woodlawn, Pa., has preliminary plans under way for a two-story forge and blacksmith shop for municipal service, to be 50 x 75 ft. Carlisle & Sharer, 7119 Jenkins Arcade Building, Pittsburgh, are architects.

The Philadelphia Co., Pittsburgh, operating the Pittsburgh Railways, has tentative plans under way for extensions and improvements in car shops and car barns, additional track and line construction, power betterments, and for the purchase of about 200 new cars. Arrangements are being made to secure a fund of \$5,000,000, to be used in part for the work.

The Wharton Motors Co., Johnstown, Pa., is planning for the erection of a three-story factory to manufacture automobile equipment, estimated to cost about \$100,000. W. H. Lamborne is manager.

The United States Arsenal, Pittsburgh, Maj. Francis F. Jewett, commandant, is considering the establishment of an aviation station. Negotiations are under way with the Chamber of Commerce and the city regarding the land. The station will include a complete repair shop for general work and parts manufacture, hangars, etc., and will be under the direction of the United States Aero Service.

Struble & Riley, Turtle Creek, Pa., are having plans prepared for a two-story automobile service and repair building,

75 x 175 ft., estimated to cost about \$150,000, including equipment. S. C. Richards & Co., 430 Library Street, Brad-dock, Pa., are architects.

A vocational department will be installed in the two-story high school to be erected by the Board of Education, Terra Alta, W. Va., estimated to cost about \$125,000. Richard M. Bates, First National Bank Building, Huntington, W. Va., is architect.

The Babcock Coal & Coke Co., Fayetteville, W. Va., will install electric motors and other equipment at its No. 7 mine, Nuttall district, Cliff Top.

The Simons-Woodward Auto Co., Spencer, W. Va., is having plans prepared for a two-story and basement automobile service and repair building, 50 x 130 ft. Richard M. Bates, First National Bank Building, Huntington, W. Va., is architect.

A vocational department will be installed in the two-story and basement high school to be constructed at Sand Fork, W. Va., by the Board of Education of the Glenville District. J. A. Radcliffe, president, Linn, W. Va. It is estimated to cost in excess of \$75,000.

The Board of Education, Wayne, W. Va., will install a vocational department in its new high school, estimated to cost about \$250,000, plans for which will be prepared by Holmboe & Pogue, Clarksburg, W. Va., architects.

The Gulf States

BIRMINGHAM, Dec. 26.

The Greenwood Compress & Storage Co., Greenwood, Miss., is considering tentative plans for the rebuilding of its plant, recently destroyed by fire with loss reported in excess of \$500,000, including machinery, stock, etc. J. T. Allen & Co., Jackson, Miss., operate the property.

The Mo-Jo Filter Co., Rockdale, Tex., recently organized to manufacture filters and filtering equipment, has closed an agreement with the Chamber of Commerce for a site for its proposed plant. It will install equipment and begin operations at the earliest possible date. R. S. Moore is head.

The Nacogdoches Iron Works, Nacogdoches, Tex., recently organized, is arranging for the immediate establishment of a local plant and proposes to begin operations early in February. It is headed by A. W. Simmons, Athens, Tex., and H. D. Minick, Jacksonville, Tex.

The Hastings Machine Co., Hastings, Fla., recently organized as a subsidiary of the Big Brick Garage Co., is planning to establish a general machine and repair plant, with department to manufacture farming implements and other products.

The Edna Light, Ice & Water Co., Edna, Tex., is planning the installation of new electrical equipment at its power plant. It is also proposed to increase the capacity of the ice-manufacturing plant with additional machinery.

The Wortham Refining Co., Wortham, Tex., recently organized, has acquired property in the northern section of the city for a new oil refinery. Ground will be broken soon for the first unit, to have a capacity of about 400 bbl. per day. H. G. Lemendes is president, and Roger Seeley, secretary and treasurer.

The Alexandria Refining Co., Alexandria, La., has acquired a site at South Alexandria for its proposed new oil refinery and will proceed with erection at once. E. M. Talley is manager.

A vocational department will be installed in the new high school to be erected at Amarillo, Tex., estimated to cost about \$400,000. Parker & Rittenberry, Amarillo, are architects.

The Stacey Co., Dallas, Tex., manufacturer of cotton-cleaning machinery, is negotiating for a site for a new factory. It recently increased its capital to \$50,000 for expansion.

The Board of City Commissioners, Terrell, Tex., has perfected plans for the installation of new engines and other equipment at the municipal electric power plant.

The Southern Utilities Co., Palatka, Fla., will make extensions and improvements in its electric power plant at Tarpon Springs, Fla., to cost about \$25,000, exclusive of machinery. It is proposed to double the capacity. George A. Loudon is general manager.

The Magnolia Petroleum Co., Dallas, Tex., will build a tank farm at Mexia, Tex., to comprise ultimately 135 steel tanks, with aggregate capacity of 7,000,000 bbl. of oil. An initial unit of 13 steel tanks is now in course of construction.

The Amarillo Iron Foundry & Planing Mill, Amarillo, Tex., is considering rebuilding the portion of its plant recently destroyed by fire with loss of about \$25,000.

The Standard Gas & Electric Co., 308 South La Salle Street, Chicago, is considering the construction of an electric power plant in the vicinity of Mobile, Ala., estimated to cost in excess of \$400,000.

The De Land Electric Light, Power & Ice Co., De Land, Fla., has completed plans for extensions and improvements in its electric power plant to cost about \$75,000, and will commence work at once.

Milwaukee

MILWAUKEE, Dec. 26.

As usual, the machine tool trade the past week was very quiet, and no increase in activity is looked for this week, due to the general suspension of shop operations between holidays and taking of inventories. There has been a little inquiry which is expected to broaden, although the trade looks for no large materialization of purchases before Jan. 1st. Prospects for 1922 are regarded as better than those of a year ago, as there has been a definite upturn in the metal-working industries which is being interrupted only by the holiday season.

The Forster Foundry Co., Menomonie, Wis., has been incorporated with a capital stock of \$10,000 by H. L. Forster, S. A. Forster and G. A. Forster, all of Menomonie, and will leave an idle foundry building and engage in the production of gray iron, brass, bronze and aluminum castings.

The High Speed Steel & Tool Co., Green Bay, Wis., has been granted a charter to manufacture specialties, principally tool steel, tools for high-speed metal-working machines, etc. For the present it will not establish a plant, but this is in prospect. The principals are John T. Phillips, president Diamond Lumber Co., S. W. Mahaffey and F. T. Phillips, all of Green Bay.

Fairbanks, Morse & Co., Chicago, which recently completed a new gray iron foundry at its Eclipse works in Beloit, Wis., at a cost of nearly \$1,500,000, on Jan. 1 will transfer its marine engine works from Three Rivers, Mich., to Beloit to take advantage of the enlarged casting and machining facilities. The Eclipse works heretofore specialized in farm gas engines and other power units, pumps, etc., principally for agricultural purposes. George B. Ingersoll is general manager at Beloit.

The Manitowoc Church Furniture Co., Waukesha, Wis., which recently accepted plans for a steam generating plant addition, has deferred construction until spring and will not be in the market for new equipment before March 15 or April 1. Charles F. Schuetze is general manager.

The Cudahy Brothers Co., meat packer, Cudahy, Wis., awarded the general contract to the American Contracting Co., 198 Milwaukee Street, Milwaukee, for a one-story brick and concrete box and crating factory, 80 x 190 ft., to replace a shop recently destroyed by fire. New equipment will be required throughout. Edward F. Lawler is general manager.

The Board of Education, Iola, Wis., has plans by Edward Tough, architect, Madison, Wis., for a two-story addition to the high school, for vocational training. The present building also will be remodeled. The work will cost about \$85,000. E. C. Wipf is secretary.

The Manitowoc-Bulck Co., Manitowoc, Wis., owned by Hamacheck & Bleser, will build a new garage to cost \$50,000 complete. It will be 50 x 163 ft., part two stories and basement, with a machine shop and service department, 50 x 75 ft. The architects are Smith & Reynolds, local.

The Sparta, Wis., Board of Education has engaged Parkinson & Dockendorff, architects, La Crosse, Wis., to design a new high school and vocational training institute, for which purpose an appropriation of \$200,000 is available. Dr. S. D. Beebe is president of the board.

The Pabst Corporation, 917 Chestnut Street, Milwaukee, formerly the Pabst Brewing Co., has reorganized its official personnel, with Frederick Pabst as president, to succeed Col. Gustave Pabst; Harry W. Marsh, formerly secretary, as vice-president and general manager; Hugo Kuechenmeister, treasurer, and Edward F. Loeb, secretary. Besides continuing the manufacture of malt syrups, cereals, etc., the new administration has plans for converting some of the unused capacity into metal-working industries, the first to be a machine shop for producing a patented design of valve rotator for internal combustion poppet-valve engines. A small experimental shop has been operated on this design for about 18 months. Details of other plans are withheld for the present.

The E. L. M. Tire & Rubber Co., Racine, Wis., is taking bids until Jan. 7 for a two-story brick and concrete addition, 80 x 144 ft., at Deane Boulevard and the Milwaukee road tracks. With equipment, the improvement will cost about \$65,000. O. W. Dunham is secretary.

The Phono-Lamp Mfg. Co., Beloit, Wis., has been incorporated with a capital stock of \$300,000 by interests identified with the American National Mfg. Co., St. Louis, manufacturer of combination talking machines and lighting fixtures, which recently acquired the brass foundry and machine shop of Slater & Tuck at Beloit. The incorporators are M. W. Wiegand, C. A. Riemer and E. R. Lucas.

Baltimore

BALTIMORE, Dec. 27.

The Union Shipbuilding Co., Fairfield, Baltimore, has revised plans under way for a two-story building, 70 x 200 ft., bids for which will be asked in about 60 days. F. C. Stauffen is manager.

Machinery to cost in excess of \$100,000 will be installed in the three-story cooperage plant to be erected by the Brooklyn Cooperage Co., 142 Kent Avenue, Brooklyn, N. Y., in the Locust Point section, Baltimore, adjoining the plant of the American Sugar Refining Co., now in course of construction.

The Fort Avenue Garage, 725 Fort Avenue, Baltimore, will build a one-story repair and service works addition, 70 x 135 ft. Plans have been drawn.

The Smokeless Coal Corporation, Pulaski, Va., recently organized, is planning for the installation of electrical and other equipment at its properties. G. H. Snider is manager.

The Hagerstown & Frederick Electric Railway Co., Hagerstown, Md., is planning to double the capacity of its power house on Grant Street, Frostburg, Md. Power will be furnished to the Consolidation Coal Co. mines, as well as the mining properties of the Piedmont & Georges Creek Coal Co., both of which will install electrical equipment, motors, etc., for operation.

The City Council, Hagerstown, Md., will call for bids early in the spring for its proposed municipal electric power plant, preliminary plans for which are under way. It will cost about \$300,000. C. E. Davis is clerk; A. B. Grubmeyer, 21 East Franklin Street, is engineer.

Fire, Dec. 19, destroyed four hangars, repair shop, tools, etc., at the aviation property of the War Department, Washington, at Langley Field, Newport News, Va., with loss estimated at about \$200,000.

The Economy Tractor Co., Greenville, S. C., recently organized with a capital of \$100,000 to manufacture motor-driven tractors and parts, has leased a building for a temporary plant. A new factory will be erected later. W. C. Cleveland is president, and J. P. Hughes, manager.

The Southern Power Co., Charlotte, N. C., is perfecting plans for the immediate construction of its new hydroelectric power plants at Mountain Island, N. C., and at Great Falls, S. C., both on the Catawba River. The first noted will have a capacity of 80,000 hp., and the other, 60,000 hp. Contracts for the buildings have been awarded to the Rhinehart & Dennis Co., Charlottesville, Va., and to Scott, Stewart, Jones & Co., Greenville, S. C. The plants are estimated to cost in excess of \$5,000,000.

A vocational department will be installed in the two-story and basement high school to be erected at West Hickory, N. C., estimated to cost about \$80,000. Benton & Benton, Wilson, N. C., are architects.

P. L. McCall, Cedartown, Ga., is organizing a company to establish a plant to manufacture cones, tubes and similar mechanical equipment for textile mills. A site will be selected at an early date.

William J. Eisenhardt, 108 West Lombard Street, Baltimore, operating a plant for the manufacture of plated metal products, has awarded contract to E. Eyring & Sons, 3501 Faith Avenue, for an addition, 26 x 120 ft., for general manufacture, estimated to cost about \$25,000.

Fire, Dec. 18, destroyed the building of the Paul E. Blanford Co., Norfolk, Va., marine equipment, etc., with loss estimated at about \$150,000.

The Williamson Mfg. Co., Homeland Avenue and York Road, Baltimore, manufacturer of automobile equipment, is planning for enlargements and the installation of new equipment. Plans are also under consideration for the establishment of new works in another location. John S. Williamson is president.

The Wilmington Sugar Refinery Co., Wilmington, Del., will soon break ground for the first eight buildings, to form its local plant, estimated to cost in excess of \$2,500,000, including machinery, mechanical conveyors, machine repair works, etc.

F. E. Hatch, Albany, Ga., is organizing a company to construct a hydroelectric power plant at Banks Mill Pond.

The Triangle Motor Co., 3 New York Avenue, N. E., Washington, has completed plans and will commence the immediate erection of a two-story repair and service building, 66 x 100 ft., at 19 New York Avenue, N. E., estimated to cost about \$35,000.

The Georgia Fullers Earth Co., Lumpkin, Ga., is planning for the installation of a mechanical conveying system at its property. Other field and operating machinery will also be installed. D. W. Bailey is head.

A vocational department will be installed in the new

high school to be erected by the Board of Education, Raleigh, N. C., estimated to cost about \$500,000, bonds for which are now being arranged. C. Gadsden Sayre, Raleigh, is architect.

The W. H. Winborne Co., Conway, S. C., is planning the erection of a two-story plant, 80 x 105 ft., to manufacture ceilings, moldings, etc. Work will commence at an early date. W. H. Winborne is president.

The Board of Commissioners, Pilot Mountain, N. C., has approved a bond issue of \$40,000 for the construction of a municipal electric light and power plant. P. E. Simmons is secretary.

Indiana

INDIANAPOLIS, Dec. 27.

The Wayne Oil & Tank Co., 58 West New York Avenue, Indianapolis, is considering the erection of an addition to cost about \$150,000, including machinery.

The Board of Education, Fort Wayne, Ind., has had plans prepared for a two-story and basement vocational shop at the central high school, estimated to cost about \$200,000. A portion of the structure will be reserved for a gymnasium. Bids will be asked in the spring. Charles R. Weatherhogg, 405 Citizens' Trust Building, is architect. Byron Summers is president of the board.

The Lock Joint Tube Co., Mishawaka, Ind., manufacturer of metal tubing and other products, has plans under way for a new one-story factory, 45 x 90 ft., estimated to cost about \$30,000.

The Kemp Machine Works, Muncie, Ind., will devote production in the future to pistons, piston rings, tools and kindred specialties, changing over from engine manufacture for marine and aeroplane service, as heretofore conducted.

The Common Council, Linton, Ind., has preliminary plans in preparation for a municipal electric light and power plant. The Shrouds-Stoner Co., Tribune Building, Terre Haute, Ind., is architect.

The American Coating Mills, Elkhart, Ind., manufacturer of coated paper products, will erect a five-story building, 100 x 125 ft., estimated to cost about \$250,000.

The Model Machine Works, Frankfort, Ind., heretofore operated by Perry Goble, has been acquired by J. M. Neher, who will take immediate possession. Operations will be continued as heretofore.

The Central South

ST. LOUIS, Dec. 26.

The E. K. Campbell Heating Co., Kansas City, Mo., manufacturer of heating equipment, furnaces, etc., is planning the erection of a new one-story factory, 75 x 130 ft. Carl Bolb & Brother, Kansas City, are architects.

Fire, Dec. 15, destroyed the plant of the Pine Bluff Spoke Co., Pine Bluff, Ark., with loss estimated at about \$50,000, including machinery. It is planned to rebuild.

The City Council, Woodward, Okla., is perfecting plans for a municipal electric light and power plant, estimated to cost about \$100,000. Bonds will be provided.

The Caddo River Power & Irrigation Co., Little Rock, Ark., recently organized with a capital of \$1,000,000, has been granted permission to construct a hydroelectric power plant near Arkadelphia, on the Caddo River, estimated to cost close to \$800,000. H. L. Rammel is president, and H. C. Couch, secretary.

A. Y. Burrows, Knoxville, Tenn., and Jefferson Kinsel, Clearfield, Tenn., are organizing a company with capital of \$500,000 to build a plant in the vicinity of Knoxville, to manufacture torpedoes, etc., for aerial service.

A vocational department will be installed in the junior high school to be erected at Cherryvale, Kan., estimated to cost about \$100,000. J. H. Felt & Co., 800 Grand Avenue, Kansas City, Mo., are architects.

The Thomas Fruit Co., Joplin, Mo., has acquired an existing building and will remodel the structure for a new cold storage plant, estimated to cost about \$75,000, including equipment. Charles A. Moore, 646 Plymouth Building, Minneapolis, Minn., is engineer. Abner Thomas is president.

The Russellville Compress Co., Russellville, Ark., recently organized, has taken title to about 12 acres of land as a site for new works, estimated to cost approximately \$50,000, including equipment. Plans are being prepared. A. N. Falls is secretary.

The Seymour Packing Co., Topeka, Kan., has awarded a contract to F. M. Spencer & Son, Mulvane Building, for the erection of a three-story addition, 50 x 150 ft., to be equipped as a cold storage plant, estimated to cost close to \$100,000. The Tait-Nordmeyer Engineering Co., St. Louis, is engineer.

A one-story power house will be erected at the plant of the United Casket Co., 3022 West Chestnut Street, Louis-

ville, in connection with the construction of an extension, 100 x 450 ft.

The Jenner-Woody Motor Co., Louisville, has tentative plans for new works at Twelfth Street and Broadway, estimated to cost about \$100,000. John W. Jenner is president and general manager. Leslie V. Abbott, Thierman Apartments, is architect.

The Common Council, Columbia, Mo., will commence the immediate construction of a new municipal electric light and power plant, estimated to cost about \$100,000. Plans have been completed.

The Osage Power Co., Lamar, Mo., is perfecting plans for its proposed hydroelectric generating plant on the Osage River, near Bagnell, Mo., with initial capacity of 40,000-hp. R. Williams, company address, is consulting engineer.

A vocational department will be installed in the two-story and basement high school to be erected at Bowling Green, Ky., estimated to cost about \$100,000. Bids will be asked early in 1922. L. D. Hanes is president of the board.

The Joseph Forshaw Stove & Heating Co., 111 North Twelfth Street, St. Louis, is clearing the site for a new seven-story and basement building, 50 x 100 ft., contract for which has been awarded to the James Godfrey Co., Wainwright Building. It is estimated to cost about \$75,000.

The Board of Education, Wichita, Kan., is arranging for a bond issue of \$1,000,000 for the erection of a new high school, including vocational department. Lorents, Schmidt & Co., 121 North Market Street, are architects.

Detroit

DETROIT, Dec. 27.

The Michigan Chandelier Co., 1745 Brush Street, Detroit, manufacturer of brass and other lighting fixtures, has tentative plans under way for the erection of a three-story factory on Chene Street, 20 x 110 ft., estimated to cost \$75,000, including equipment. The Building Service Bureau, 1336 Brush Street, is architect.

Fire, Dec. 23, destroyed the power plant of the Consumers' Power Co., near Big Rapids, Mich., with loss estimated at \$350,000, including equipment. It is planned to rebuild. Offices of the company are at Grand Rapids, Mich.

The Dry-Kold Refrigerator Co., Niles, Mich., manufacturer of electrically operated refrigerators, has construction under way on an addition to its plant.

The Crodius Steam Pressed Brick Co., Pontiac, Mich., has tentative plans for the erection of a new factory on Sanderson Street. It is proposed to call for bids in the spring. C. J. Crawford is president.

The West Michigan Steel Foundry Co., Muskegon, Mich., is considering rebuilding its plant, almost completely destroyed by fire, Dec. 14, with loss reported at \$150,000.

A one-story power house, 38 x 60 ft., will be constructed at the plant of the Belle Isle & East Side Creamery Co., Detroit. Williams Brothers, 1111 Kresge Building, architects, have completed plans.

The Union Bag & Paper Co., Sheboygan, Mich., will make extensions and improvements in its plant, including the remodeling of the present mill, 60 x 100 ft., estimated to cost about \$100,000. G. S. Witham is general superintendent.

Daniel J. Ryan, formerly sales manager of the Detroit Nickel Plating & Mfg. Co., Detroit, has organized the General Electro-Plating & Mfg. Co., 465 York Street, with a capital stock of \$10,000, to do a general jobbing business and to manufacture brass, bronze and aluminum castings. The officers are Daniel J. Ryan, president and sales manager; James Kane, vice-president, and William Wallace, formerly connected with the Studebaker Corporation, secretary-treasurer. The company is in the market for foundry equipment and polishing lathes.

Dividend disbursement by industrial, commercial and banking interests at Youngstown, Ohio, largely representing fourth quarter payments, will approximate \$1,500,000. In most cases the dividends are payable Jan. 2. In disbursing \$575,000 on its common and preferred stocks, the Youngstown Sheet & Tube Co. will lead in the distribution, followed by the Trumbull Steel Co., which will pay a total of about \$285,000 on both issues. The Sheet & Tube Company common payment is at the rate of 50c. per share, while the Trumbull Company will disburse 15c. per share on common. The Standard Textile Products Co. will pay \$140,000 in dividends. Other dividend distributors at Youngstown will be the Brier Hill Steel Co., Newton Steel Co., Falcon Steel Co. and General Fireproofing Co.

The assets of the Federal Corporation, Westfield, Mass., have been sold by the trustee of the property to Richard J. Burton, Brookline, Mass. The real estate is not involved in the deal, since the property was taken over by the First National Bank, Boston, to satisfy its mortgage. The company manufactured spark plugs, rim tools, lamps, electric sockets and other accessories.

IRON AND INDUSTRIAL STOCKS

Values in General Have Shrunk During the Past Week or Ten Days

Values of securities in general have shrunk since last reports. The aggressive buying power which raised prices so substantially through November and early December is not in evidence. On the other hand, the pressure to sell stocks and bonds is not severe, and for the moment can be traced to higher money rates. People who heretofore borrowed money to buy securities are the chief sellers of securities to-day. There is comparatively little liquidating by real investors, because it is felt the high money rates are temporary and that following the seasonable lull in commercial buying will come a gradual improvement in business. Security investors, as a rule, do not look for a business boom, however, but rather the long pull to prosperity. The liquidation of frozen credits is progressing favorably and should end within the next few months. Prices for staple commodities in a great many instances have been thoroughly liquidated. It only remains for a buying power to develop, and a buying power in a country with as much money as is contained in the United States cannot lie dormant indefinitely. Which explains why the real investor is not anxious to sell stocks and bonds. There are, of course, people who recently have sold stocks because they were uneasy over developments in certain industries, but this does not apply to iron and steel stocks. It is true that holders of some iron and steel stocks are uneasy due to curtailed plant operations with resultant negative earnings, but these conditions in a very large measure are offset by consolidations of properties possibilities, attractive from the economic as well as the conversion viewpoint.

The range of prices on active iron and industrial stocks from Monday of last week to Monday of this week was as follows:

Allis-Chalm. com.	37½-39½	Lackawanna Steel.	42½-46½
Allis-Chalm. pf...	87½-89	Midvale Steel....	26-28½
Am. Can com.	32½-35½	Nat.-Acme	10-12½
Am. Can pf.....	93½-94½	Nat. E. & S. com.	35½-38½
Am. C. & F. com.	142½-144½	N. Y. Air Brake..	—-57½
Am. C. & F. pf...	—-113½	Nova Scotia Steel.	23-24
Am. Loco. com...	98½-104	Penn. Steel com...	63-66
Am. Loco. pf.....	—-114½	Penn. Steel pf....	91½-93
Am. Radiator com.	—-88½	Ry. Stl. Spg. com.	89½-91½
Am. Steel F. com.	31½-33½	Replogle Steel....	24-26½
Bald. Loco. com.	94½-97½	Republic com.....	50-53½
Bald. Loco. pf...	—-104	Republic pf.....	82½-84½
Beth. Steel com...	52-53	Sloss com.....	—-38
Beth. Stl. Cl. B.	55½-57	Sloss pf.....	—-72
Chic. Pneu. Tool.	58½-62	Un. Alloy Steel...	25½-25½
Colorado Fuel....	24½-26½	U. S. Pipe com...	16½-17½
Cruc. Steel com...	64½-67½	U. S. Pipe pf....	—-52½
Cruc. Steel pf....	86½-87	U. S. Steel com...	82½-84½
General Electric.	136½-140½	U. S. Steel pf....	113½-115
Gt. No. Ore Cert.	31½-32	Vanadium Steel...	31-32½
Gulf States Steel.	46½-47	Westing'g's Elec.	49½-51
Int. Har. com....	82½-83½		

Purchase of Haskell & Barker Car Co. Approved

At a special meeting at Chicago on Dec. 20, stockholders of the Pullman Co. voted to approve the purchase of the property and assets of the Haskell & Barker Car Co. and to increase the capital stock of the Pullman Co. from \$120,000,000, consisting of 1,200,000 shares at \$100 par to \$135,000,000 consisting of 1,350,000 shares at \$100 par each. Terms upon which the Pullman Co. will take over the Haskell & Barker interests are as follows: The Pullman Co. is to assume all debts and obligations of the Haskell & Barker Car Co. It will then issue to the directors of the other concern, 165,000 shares of Pullman stock. The Haskell & Barker Car Co. will have the right to declare and pay the stockholders out of its assets, before the purchase by the Pullman Co., an extra dividend of \$1.25 per share upon present outstanding capital stock, amounting to \$275,000. The stockholders of the Pullman Co. consent that the 150,000 shares of new stock of that company authorized by amendment to the charter, may be issued and delivered to directors of the Haskell & Barker Car Co., as part of the 165,000 shares called for by the terms of the purchase. Three new directors of the Pullman Co. were elected by the Pullman Co. stockholders: Edward F. Carry, president Haskell & Barker Car Co., Inc.; John R. Morrow and Arthur O. Choate, both of New York.

The report that the Lima Locomotive Co., Lima, Ohio, will be added to the consolidated car company, has not been confirmed up to date.

The Elwood Foundry Co., Elwood, Ind., has been declared a voluntary bankrupt in the federal court at Indianapolis. Liabilities amount to about \$12,000 and the assets, including real estate, to a trifle more than that sum.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The quotations given below are for small lots, as sold from stores in New York City by merchants carrying stocks.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

Bars:	Per Lb.
Refined bars, base price.....	2.68c.
Swedish bars, base price.....	10.00c.
Soft steel bars, base price.....	2.68c.
Hoops, base price.....	3.53c.
Bands, base price.....	3.28c.
Beams and channels, angles and tees	
3 in. x ¼ in. and larger, base.....	2.78c.
Channels, angles and tees under 3 in. x	
¼ in., base.....	2.68c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger.....	2.65c.
(Smooth finish, 1 to 2½ x ¼ in. and larger)..	2.85c.
Toe calk, ½ x ¾ in. and larger.....	3.25c.
Cold-rolled strip, soft and quarter hard..	6.25c. to 7.25c.
Open-hearth spring steel.....	3.75c. to 6c.
Shafting and Screw Stock:	
Rounds.....	3.88c.
Squares, flats and hex.....	4.38c.
Standard cast steel, base price.....	12.00c.
Extra cast steel.....	17.00c.
Special cast steel.....	22.00c.

Tank Plates—Steel

¼ in. and heavier.....	2.78c.
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Sheets

Blue Annealed

	Per Lb.
No. 10.....	3.28c. to 3.53c.
No. 12.....	3.33c. to 3.58c.
No. 14.....	3.38c. to 3.63c.
No. 16.....	3.48c. to 3.73c.

Box Annealed—Black

	Soft Steel C. R., One Pass Per Lb.	Blued Stove Pipe Sheet, Per Lb.
Nos. 18 to 20.....	3.80c.
Nos. 22 and 24.....	3.85c.	4.10c.
No. 26.....	3.90c.	4.15c.
No. 28.....	4.00c.	4.25c.
No. 30.....	4.25c.
No. 28 and lighter, 36 in. wide, 10c. higher.		

Galvanized

	Per Lb.
No. 14.....	3.95c. to 4.10c.
No. 16.....	4.10c. to 4.25c.
Nos. 18 and 20.....	4.25c. to 4.40c.
Nos. 22 and 24.....	4.40c. to 4.55c.
No. 26.....	4.55c. to 4.70c.
No. 27.....	4.70c. to 4.85c.
No. 28.....	4.85c. to 5.00c.
No. 30.....	5.35c. to 5.50c.
No. 28 and lighter, 36 in. wide, 20c. higher.	

Welded Pipe

Standard Steel		Wrought Iron	
Black	Galv.	Black	Galv.
½ in. Butt... —56	—40	¾-in. Butt... —30	—13
¾ in. Butt... —61	—47	1½-in. Butt... —32	—15
1-3 in. Butt... —63	—49	2-in. Lap.... —27	—10
3½-6 in. Lap... —60	—46	2½-6-in. Lap... —30	—15
7-8 in. Lap... —56	—34	7-12-in. Lap... —23	—7
9-12 in. Lap... —55	—33		

Steel Wire

	Per Lb.
Bright basic.....	4.00c.
Annealed soft.....	4.00c.
Galvanized annealed.....	4.75c.
Coppered basic.....	4.50c.
Tinned soft Bessemer.....	6.00c.

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet.....	17¼c. to 17½c.
High brass wire.....	17¼c. to 17½c.
Brass rod.....	14¼c. to 15 c.
Brass tube, brazed.....	26 c. to 27½c.
Brass tube, seamless.....	18¼c. to 19 c.
Copper tube, seamless.....	21¼c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 21¼c. per lb. base.	
Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.	

Tin Plates

Bright Tin	Grade	Grade	Coke—14-20	Primes	Wasters
	"AAA"	"A"			
	Charcoal	Charcoal			
	14x20	14x20			
IC..	\$10.00	\$8.50	80 lb....	\$6.05	\$5.80
IX..	11.25	10.00	90 lb....	6.15	5.90
IXX..	13.00	11.50	100 lb....	6.25	6.00
IXXX..	14.75	13.25	IC...	6.40	6.15
IXXXX..	16.25	15.00	IX...	7.40	7.15
			IXX...	8.40	8.15
			IXXX...	9.40	9.15
			IXXXX...	10.40	10.15

Terne Plates

8-lb. Coating 14 x 20

100 lb.	\$7.00
IC.....	7.25
IX.....	7.50
Fire door stock.....	10.00

Tin

Straits, pig.....	35c.
Bar.....	40c. to 45c.

Copper

Lake ingot.....	16 c.
Electrolytic.....	15¼c.
Casting.....	15¼c.

Spelter and Sheet Zinc

Western spelter.....	6¼c. to 7c.
Sheet zinc, No. 9 base, casks.....	10½c. open 11c.

Lead and Solder*

American pig lead.....	5¼c. to 6¼c.
Bar lead.....	6¼c. to 7 c.
Solder, ½ and ¼ guaranteed.....	27c.
No. 1 solder.....	25c.
Refined solder.....	21c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.....	80c.
Commercial grade, per lb.....	40c.
Grade D, per lb.....	35c.

Antimony

Asiatic.....	6¼c. to 6½c.
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Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb....	29c. to 31c.
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Old Metals

Prices are firm but business is quiet. Dealers' buying prices are nominally as follows:

	Cents Per Lb.
Copper, heavy crucible.....	11.25
Copper, heavy wire.....	10.75
Copper, light and bottoms.....	8.25
Brass, heavy.....	5.50
Brass, light.....	4.50
Heavy machine composition.....	8.00
No. 1 yellow brass turnings.....	5.50
No. 1 red brass or composition turnings.....	7.00
Lead, heavy.....	3.75
Lead, tea.....	2.50
Zinc.....	2.50

